SEQUENCE LISTING

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<110> Muller, Mathias L.
     True, Thom
     Simmons, Carl R.
     Yalpani, Nasser
<120> Novel compositions with chitinase
     activity
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<150> 10/389,432
<151> 2003-03-14
<150> 10/290,086
<151> 2002-11-06
<150> 60/337,029
<151> 2001-11-07
<150> 60/420,666
<151> 2002-10-22
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<400> 1
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                5
                                  10
Cys Gly Thr Thr Asp Ala Tyr Cys Gly Asp Gly Cys Gln Ser Gly Pro
                              25
40
Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala Phe Phe
                       55
                                          60
Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe
                   70
                                      75
Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Asn Ala Tyr Pro Gly Phe
               85
                                  90
Ala His Gly Gly Thr Glu Val Glu Gly Lys Arg Glu Ile Ala Ala Phe
           100
                              105
Phe Ala His Val Thr His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu
                           120
                                              125
Ile Asn Lys Ser Asn Ala Tyr Cys Asp Ala Ser Asn Arg Gln Trp Pro
                       135
Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser
                   150
                                      155
Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Asp Ile Gly Phe Asn Gly
               165
                                  170
Leu Ala Asp Pro Asn Arg Val Ala Gln Asp Ala Val Ile Ala Phe Lys
                               185
Thr Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met Pro Gln
                           200
                                              205
Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asn
```

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235
Tyr Cys Gln Gln Leu Arg Val Asp Pro Gly Pro Asn Leu Thr Cys
                                    250
<210> 2
<211> 248
<212> PRT
<213> Zea mays
<400> 2
Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe Gly Tyr
                                   10
Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser Gly Pro
Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala Asn Val
Ala Ser Val Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Ser Gln Ala
Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala Phe Leu
Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser Gln Val
                                    90
Gln Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Ala Thr His Glu
                                105
Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn Ala Tyr
                            120
Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln Lys Tyr
                        135
Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr Gly Pro
                    150
                                        155
Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro Gly Arg Val
                165
                                    170
Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe Trp Met
                                185
Asn Ser Val His Gly Val Val Pro Gln Gly Phe Gly Ala Thr Thr Arg
                            200
Ala Ile Asn Gly Ala Leu Glu Cys Gly Gly Asn Asn Pro Ala Gln Met
                        215
                                            220
Asn Ala Arg Val Gly Tyr Tyr Arg Gln Tyr Cys Arg Gln Leu Gly Val
                    230
Asp Pro Gly Pro Asn Leu Thr Cys
                245
<210> 3
<211> 777
<212> DNA
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1)...(777)
<400> 3
tcg atg cag aac tgc ggc tgc cag cca aac ttc tgc tgc agc aag ttc
                                                                   48
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Phe Cys Cys Ser Lys Phe
```

Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr Lys Gln

						-	_						cag Gln	_	96
													gga Gly		144
	_		_						_		-	_	gac Asp		192
													ggc Gly		240
65					70					75				80	
													tac Tyr 95		288
													atc Ile		336
													tac Tyr		384
			_		_	_	_			_	_		aac Asn	_	432
													ccg Pro		480
													atc Ile 175		528
													gtg Val		576
		_		_					_		_		gly ggg		624
_	_	_				_				_			 gcc Ala		672
													ggc Gly		720
	-	_		_	_	_		_	_	_			aac Asn 255		768
act	tgc	tag													777

Thr Cys * <210> 4 <211> 258 <212> PRT <213> Artificial Sequence <220> <223> Variant sequence produced by shuffling techniques <400> 4 Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Phe Cys Cys Ser Lys Phe Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser Gly Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala Phe Phe Asn Gly Ile Lys Ser Gln Ala Gly Ser Gly Cys Glu Gly Lys 75 Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro 90 Gly Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala 105 Ala Phe Phe Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile 120 Asn Glu Ile Asp Gly Pro Ser Lys Asn Tyr Cys Asp Arg Asn Asn Thr 135 140 Gln Trp Pro Cys Gln Ala Gly Lys Gly Tyr Tyr Gly Arg Gly Pro Leu 150 155 Gln Ile Ser Trp Asn Phe Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly 165 170 Phe Asp Gly Leu Gly Asp Pro Gly Arg Val Ala Arg Asp Ala Val Val 180 185 Ala Phe Lys Ala Ala Leu Trp Phe Trp Met Asn Ser Val His Gly Val 200 Met Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu 215 Glu Cys Asn Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr 230 235 Tyr Lys Gln Tyr Cys Gln Gln Leu Arg Val Asp Pro Gly Pro Asn Leu 245 250 Thr Cys

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<210> 5
<211> 756
<212> DNA
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1)...(756)
<400> 5
tcg atg cag aac tgc ggc tgc gcg tcg ggc ctg tgc tgc agc cgg ttc
Ser Met Gln Asn Cys Gly Cys Ala Ser Gly Leu Cys Cys Ser Arg Phe
```

48

1				5					10					15		
	tac Tyr															96
	ccg Pro	_	_	_					_	_						144
	gtg Val 50	-	_	-	-									_	_	192
	gcc Ala															240
	ctg Leu	_	_	_	_						_				_	288
	gtg Val			_	_			_	_					_	_	336
	gag Glu															384
	aac Asn 130															432
	gly aaa															480
	ggg ggg	Pro	Ala	Gly	Arg	Ala	Ile	Gly	Phe	Asp		Leu	Gly	Asp	Pro	528
. –	agg Arg				_	_					_		_			576
	tgg Trp	_	_		_		_		_		_				_	624
	atc Ile 210		-				-			_						672
_	cag Gln	_			_	-					_		_	_	_	720
	ggc Gly															756

```
<210> 6
<211> 251
<212> PRT
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
<400> 6
Ser Met Gln Asn Cys Gly Cys Ala Ser Gly Leu Cys Cys Ser Arg Phe
Gly Tyr Cys Gly Thr Thr Asp Ala Tyr Cys Gly Asp Gly Cys Gln Ser
Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala
                            40
Asn Val Ala Ser Val Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Ser
Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala
Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser
                                    90
Glu Val Glu Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Val Thr
                                105
His Glu Thr Gly His Phe Cys Tyr Ile Asn Glu Ile Asp Gly Pro Ser
                            120
                                                 125
Lys Asn Tyr Cys Asp Arg Asn Asn Thr Gln Trp Pro Cys Gln Ala Gly
                        135
                                            140
Lys Gly Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn
                    150
                                        155
Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro
                165
                                    170
Gly Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp
                                185
Phe Trp Met Lys Asn Met His Gln Leu Met Pro Gln Gly Phe Gly Ala
        195
                            200
Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asn Gly Asn Asn Pro
                        215
Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr Arg Gln Tyr Cys Arg Gln
                    230
                                        235
Leu Gly Val Asp Pro Gly Asn Asn Leu Thr Cys
                245
<210> 7
<211> 774
<212> DNA
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1) ... (774)
<400> 7
tcg atg cag aac tgc ggc tgc cag ccg aac gta tgc tgc agc aag ttt
                                                                   48
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
ggc tac tgc ggc acg acc gac gag tac tgc ggc gac ggg tgc cag tcg
                                                                   96
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
```

										ggc Gly				144
										gtc Val 60				192
										Gly 999				240
				_			_	_	_	gtc Val			_	288
										aag Lys				336
										cat His				384
										gcg Ala 140				432
	_	_	 		_	_				cgc Arg	 _	_	_	480
										agg Arg				528
										agc Ser				576
										gtg Val				624
_	_			_				_		aac Asn 220	 _			672
										cgc Arg				720
										Gly 999				768
tgc Cys	tga *													774

<210> 8 <211> 257

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<212> PRT
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
<400> 8
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
                                                      15
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
                               25
40
Gly Gly Ser Gly Gly Ala Asn Val Ala Ser Val Val Thr Gly Ser
                       55
Phe Phe Asn Gly Ile Lys Ser Gln Ala Gly Ser Gly Cys Glu Gly Lys
                   70
Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Asn Ala Tyr Pro
Gly Phe Ala His Gly Gly Thr Glu Val Glu Gly Lys Arg Glu Ile Ala
                               105
Ala Phe Phe Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile
                           120
Ser Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Ala Ser Asn Arg Gln
                       135
                                           140
Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln
                   150
                                       155
Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ser Leu Gly Phe
               165
                                   170
Asp Gly Leu Gly Asp Pro Asp Ala Val Ala Arg Ser Ala Val Leu Ala
           180
                               185
                                                   190
Phe Arg Ser Ala Leu Trp Tyr Trp Met Asn Asn Val His Gly Val Val
                           200
                                               205
Pro Gln Gly Phe Gly Ala Thr Thr Arg Ala Ile Asn Gly Ala Leu Glu
                       215
                                           220
Cys Asn Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr
                   230
                                       235
Arg Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr
               245
                                   250
Cys
<210> 9
<211> 756
<212> DNA
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1) ... (756)
<400> 9
teg acg cag aac tgc ggc tgc gcg tcg ggc ctg tgc tgc agc cgg ttc
                                                                 48
Ser Thr Gln Asn Cys Gly Cys Ala Ser Gly Leu Cys Cys Ser Arg Phe
1
ggc tac tgc ggc acg acc gac gcc tac tgc ggc gac ggg tgc cag tcg
                                                                 96
Gly Tyr Cys Gly Thr Thr Asp Ala Tyr Cys Gly Asp Gly Cys Gln Ser
```

									agc Ser							144
									ttc Phe							192
_	_		_		_			_	aat Asn					_		240
	_			_	_				ggc Gly 90		_				_	288
									gcc Ala							336
						_			aac Asn			_		_	_	384
_			_	_					cag Gln		_	_	_			432
_					_		_	_	cag Gln		_					480
									ttc Phe 170							528
									gcg Ala							576
									atg Met							624
			_				_		gag Glu	_						672
_	_	_			_	_			tac Tyr		_		_	_	_	720
		_	_	_					acc Thr 250	_	tga *					756

<210> 10

<211> 251

<212> PRT

<213> Artificial Sequence

Ser Thr Gln Asn Cys Gly Cys Ala Ser Gly Leu Cys Cys Ser Arg Phe

<400> 10

```
10
Gly Tyr Cys Gly Thr Thr Asp Ala Tyr Cys Gly Asp Gly Cys Gln Ser
                             25
Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala
                          40
Asn Val Ala Ser Val Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Ser
                      55
Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala
                  70
                                     75
Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser
                                 90
Glu Val Glu Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Val Thr
                             105
His Glu Thr Gly His Phe Cys Tyr Ile Asn Glu Ile Asp Gly Pro Ser
       115
                          120
Lys Asn Tyr Cys Asp Arg Asn Asn Thr Gln Trp Pro Cys Gln Ala Gly
                      135
                                         140
Lys Gly Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn
                  150
                                     155
Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro
               165
                                 170
Gly Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp
           180
                              185
Phe Trp Met Lys Asn Met His Gln Leu Met Pro Gln Gly Phe Gly Ala
       195
                          200
                                             205
Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asn Gly Asn Asn Pro
                      215
                                         220
Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr Arg Gln Tyr Cys Arg Gln
                  230
                                     235
Leu Gly Val Asp Pro Gly Asn Asn Leu Thr Cys
               245
<210> 11
<211> 774
<212> DNA
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1) ... (774)
<400> 11
tcg atg cag aac tgc ggc tgc cag cca aac gta tgc tgc agc aag ttt
                                                              48
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
1
ggc tac tgc ggc acg acc gac gag tac tgc ggc gac ggg tgc cag tcg
                                                              96
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
            20
144
```

	35					40					45					
						gcg Ala 55										192
						aac Asn										240
						gcg Ala										288
						tcc Ser										336
						acg Thr										384
						aac Asn 135										432
	_	_	_	_		cag Gln	_				_					480
	_					tac Tyr						_				528
						ggc Gly										576
	_	_				ttc Phe		_					_		_	624
						acc Thr 215										672
_						gcc Ala	_	_			_	_				720
						ctc Leu										768
tgc Cys	tga *															774

<210> 12

<211> 257

<212> PRT

<213> Artificial Sequence

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<223> Variant sequence produced by shuffling techniques
<400> 12
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala
Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys
Asn Phe Tyr Thr Arg Ser Ala Phe Leu Glu Ala Ile Ala Ala Tyr Pro
                                   90
Gly Phe Ala His Gly Gly Ser Glu Val Glu Arg Lys Arg Glu Ile Ala
                               105
Ala Phe Phe Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile
                           120
Ser Glu Val Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln
                       135
                                           140
Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln
                   150
                                       155
Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe
               165
                                   170
Asp Gly Leu Gly Asp Pro Gly Arg Val Ala Arg Asp Ala Val Val Ala
           180
                               185
Phe Lys Ala Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met
                           200
Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu
                       215
Cys Asn Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr
                   230
                                       235
Arg Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Asn Asn Leu Thr
               245
                                   250
Cys
<210> 13
<211> 756
<212> DNA
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1)...(756)
<400> 13
teg atg cag aac tge gge tge geg teg gge etg tge tge age egg tte
                                                                48
Ser Met Gln Asn Cys Gly Cys Ala Ser Gly Leu Cys Cys Ser Arg Phe
gge tae tge gge aeg ace gae gee tae tge gge gae ggg tge eag teg
                                                                96
Gly Tyr Cys Gly Thr Thr Asp Ala Tyr Cys Gly Asp Gly Cys Gln Ser
            20
ggc ccg tgc cgc tcg ggc ggc ggc ggc agc agt ggc ggc ggt ggt gcg
                                                                144
```

<220>

Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala

35 40 45

	gtg Val 50															192
	gcc Ala															240
	ctg Leu	_	_	_	_						_				_	288
	gtg Val			_	_			-	_					_	_	336
	gag Glu															384
_	aac Asn 130		_	_				_	_		_	_	_			432
	gjà aaa															480
	gly aaa					_				_				_		528
	agg Arg															576
	tgg Trp	_	_				_		_		_				_	624
	atc Ile 210															672
	cag Gln															720
	ggc	_	_	_						_	tga *					756

<210> 14

<211> 251

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant sequence produced by shuffling techniques

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Ser Met Gln Asn Cys Gly Cys Ala Ser Gly Leu Cys Cys Ser Arg Phe
Gly Tyr Cys Gly Thr Thr Asp Ala Tyr Cys Gly Asp Gly Cys Gln Ser
Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala
                          40
Asn Val Ala Ser Val Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Ser
Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala
                  70
                                     75
Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser
                                 90
Glu Val Glu Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Val Thr
                              105
His Glu Thr Gly His Phe Cys Tyr Ile Asn Glu Ile Asp Gly Pro Ser
Lys Asn Tyr Cys Asp Arg Asn Asn Thr Gln Trp Pro Cys Gln Ala Gly
                      135
Lys Gly Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn
                                     155
                  150
Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro
                                 170
               165
Gly Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp
                              185
Phe Trp Met Lys Asn Ile His Gln Leu Met Pro Gln Gly Phe Gly Ala
                          200
Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asn Gly Asn Asn Pro
                                         220
                      215
Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr Arg Gln Tyr Cys Arg Gln
                  230
                                     235
Leu Gly Val Asp Pro Gly Asn Asn Leu Thr Cys
               245
<210> 15
<211> 777
<212> DNA
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1)...(777)
<400> 15
tcg atg cag aac tgc ggc tgc cag cca aac gta tgc tgc agc aag ttc
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
ggc tac tgc ggc acg acc gac gag tac tgc ggc gac ggg tgc cag tca
                                                              96
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
144
35
ggc gga ggc agt ggc ggg gcg aac gtg gct agc gtc gtc acc ggc tcc
                                                              192
Gly Gly Ser Gly Gly Ala Asn Val Ala Ser Val Val Thr Gly Ser
```

<400> 14

								Gly 999				240
								gtc Val				288
								aag Lys				336
								cat His				384
		_	 _	_	_		_	gac Asp 140			_	432
								ggc Gly				480
								gly aaa				528
								cgg Arg				576
	_					 _	_	aac Asn	_	_		624
								atc Ile 220				672
								gcg Ala				720
							Asp	ccg Pro				768
tgc Cys	tga *											777

```
<210> 16
```

<400> 16

Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe

<211> 258

<212> PRT

<213> Artificial Sequence

⁻²²⁰⁻

<223> Variant sequence produced by shuffling techniques

```
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
40
Gly Gly Ser Gly Gly Ala Asn Val Ala Ser Val Val Thr Gly Ser
                      55
Phe Phe Asn Gly Ile Lys Ser Gln Ala Gly Ser Gly Cys Glu Gly Lys
                  70
                                      75
Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro
                                  90
Gly Phe Ala His Gly Gly Ser Glu Val Glu Gly Lys Arg Glu Ile Ala
                              105
Ala Phe Phe Ala His Val Thr His Glu Thr Gly His Phe Cys Tyr Ile
                          120
Asn Glu Ile Asp Gly Pro Ser Lys Asn Tyr Cys Asp Arg Asn Asn Thr
                      135
Gln Trp Pro Cys Gln Ala Gly Lys Gly Tyr Tyr Gly Arg Gly Pro Leu
                                      155
Gln Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly
               165
                                  170
Phe Asp Gly Leu Gly Asp Pro Gly Arg Val Ala Arg Asp Ala Val Val
                              185
Ala Phe Lys Ala Ala Leu Trp Phe Trp Met Lys Asn Met His Gln Leu
                          200
Met Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu
                      215
                                         220
Glu Cys Asn Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr
                  230
                                      235
Tyr Arg Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Asn Asn Leu
               245
                                  250
Thr Cys
```

<210> 17 <211> 280 <212> PRT

<213> Zea mays

<400> 17

Met Ala Asn Ala Pro Arg Ile Leu Ala Leu Gly Leu Leu Ala Leu Leu Cys Ala Ala Ala Gly Pro Ala Ala Ala Gln Asn Cys Gly Cys Gln Pro 25 Asn Phe Cys Cys Ser Lys Phe Gly Tyr Cys Gly Thr Thr Asp Ala Tyr Cys Gly Asp Gly Cys Gln Ser Gly Pro Cys Arg Ser Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala Phe Phe Asn Gly Ile Lys Asn Gln Ala 85 90 Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala Phe Leu 105 110 Ser Ala Val Asn Ala Tyr Pro Gly Phe Ala His Gly Gly Thr Glu Val 120 125 Glu Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Val Thr His Glu 135 140 Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn Ala Tyr 150 155 Cys Asp Ala Ser Asn Arg Gln Trp Pro Cys Ala Ala Gly Gln Lys Tyr 170

<210> 18 <211> 269 <212> PRT <213> Zea mays <400> 18 Pro Gln Leu Val Ala Leu Gly Leu Ala Leu Cys Ala Val Ala Gly Pro Ala Ala Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys 40 Gln Ser Gly Pro Cys Arg Ser Gly Arg Gly Gly Gly Ser Gly Gly 55 Gly Gly Ala Asn Val Ala Ser Val Val Thr Ser Ser Phe Phe Asn Gly 70 75 Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Gly Tyr Pro Gly Phe Ala His 105 100 Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala 120 125 His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn 135 140 Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala 150 155 Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn 165 170 Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Gly 180 185 Asp Pro Gly Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala 200 Leu Trp Phe Trp Met Asn Ser Val His Gly Val Val Pro Gln Gly Phe 215 Gly Ala Thr Thr Arg Ala Met Gln Arg Ala Leu Glu Cys Gly Gly Asn 235 230 Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr Arg Gln Tyr Cys 245 250 Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr Cys

<210> 19

<211> 280

<212> PRT

<213> Zea mays

```
<400> 19
Met Ala Asn Ala Pro Arg Ile Leu Ala Leu Gly Leu Leu Ala Leu Leu
Cys Ala Ala Ala Gly Pro Ala Ala Ala Gln Asn Cys Gly Cys Gln Pro
Asn Phe Cys Cys Ser Lys Phe Gly Tyr Cys Gly Thr Thr Asp Ala Tyr
                            40
Cys Gly Asp Gly Cys Gln Ser Gly Pro Cys Arg Ser Gly Gly Gly Gly
Gly Gly Gly Gly Gly Gly Gly Gly Ser Gly Gly Ala Asn Val
                    70
                                        75
Ala Asn Val Val Thr Asp Ala Phe Phe Asn Gly Ile Lys Asn Gln Ala
                85
                                    90
Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala Phe Leu
            100
                               105
Ser Ala Val Asn Ala Tyr Pro Gly Phe Ala His Gly Gly Thr Glu Val
                           120
                                                125
Glu Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Val Thr His Glu
                        135
Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn Ala Tyr
                    150
                                        155
Cys Asp Ala Ser Asn Arg Gln Trp Pro Cys Ala Ala Gly Gln Lys Tyr
                                    170
Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr Gly Pro
                                185
Ala Gly Arg Asp Ile Gly Phe Asn Gly Leu Ala Asp Pro Asn Arg Val
                            200
Ala Gln Asp Ala Val Ile Ala Phe Lys Thr Ala Leu Trp Phe Trp Met
                        215
                                            220
Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr Ile Arg
                    230
                                        235
Ala Ile Asn Gly Ala Leu Glu Cys Asn Gly Asn Asn Pro Ala Gln Met
                245
                                    250
Asn Ala Arg Val Gly Tyr Tyr Lys Gln Tyr Cys Gln Gln Leu Arg Val
            260
                                265
Asp Pro Gly Pro Asn Leu Ile Cys
        275
```

<210> 20 <211> 270 <212> PRT <213> Zea mays

<400> 20 Pro Gln Leu Val Ala Leu Gly Leu Ala Leu Leu Cys Ala Val Ala Gly 10 Pro Ala Ala Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser 25 Lys Phe Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser Gly Pro Cys Arg Ser Gly Arg Gly Gly Gly Ser Gly Gly Gly Gly Ala Asn Val Ala Ser Val Val Thr Ser Ser Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr 90 Arg Ser Ala Phe Leu Ser Ala Val Asn Lys Gly Tyr Pro Gly Phe Ala 105 110 His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala Ala Phe Phe 120 125 Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile 140

Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys 150 155 Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp 170 Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu 185 Phe Asp Pro Phe Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala 200 Ala Leu Trp Phe Trp Met Asn Ser Val His Gly Val Val Pro Gln Gly 220 215 Phe Gly Ala Thr Thr Arg Ala Ile Asn Gly Ala Leu Glu Cys Gly Gly 230 235 Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr Arg Gln Tyr 250 Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr Cys 265

<210> 21 <211> 753

<212> DNA

<213> Artificial Sequence

<220>

<223> Variant sequence produced by shuffling techniques

<221> CDS

<222> (1) ... (753)

<400> 21

tcg atg cag aac tgc ggg tgc gcg tcg ggc ctg tgc tgc agc cgg ttc 48
Ser Met Gln Asn Cys Gly Cys Ala Ser Gly Leu Cys Cys Ser Arg Phe
1 5 10 15

ggg tac tgc ggc acg acc gac gag tac tgc ggc gac ggg tgc cag tcg 96 Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser 20 25 30

ggc ccg tgc cgc tcg ggc ggc ggc ggc agc agt ggc ggt ggt gcg 144 Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Gly Ala 35 40 45

aac gtg gct agc gtc gtc acc ggc tcc ttc ttc aac ggc atc aag agc 192 Asn Val Ala Ser Val Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Ser 50 55 60

cag gcc ggg agc ggg tgc gag ggc aag aac ttc tac acc cgg agc gcg 240 Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala 65 70 75 80

ttc ctg agc gcc gtc aag gcg tac cca ggc ttc gcc cat ggc ggg tcg 288
Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser

cag gtg cag ggc aag cgc gag atc gcc gcc ttc ttc gcg cac gcc acg 336 Gln Val Gln Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Ala Thr

cac gag acc ggg cat ttc tgc tac atc agc gag atc aac aag agc aac 384 His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn 115 120 125

gcc tac tgc gac ccg acc aag agg cag tgg ccg tgc gcc gcg ggg cag 432

```
Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln
    130
                        135
aag tac tac ggg cgc ggc ccg ctg cag atc tcg tgg aac tac aac tac
                                                                   480
Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr
                    150
                                        155
ggg ccc gcg ggg agg gcc atc ggc ttc gac ggg ctc ggg gac ccc ggc
                                                                   528
Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro Gly
                                    170
agg gtg gcg cgg gac gcc gtg gtg gcg ttc aag gcg gcg ctc tgg ttc
                                                                   576
Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe
            180
                                185
tgg atg aac aac gtg cac cgt gtg atg ccg cag ggc ttc ggc gcc acc
                                                                   624
Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr
        195
                            200
ate agg gee ate aac gge geg ete gag tge aac ggg aac aac eec gee
                                                                   672
Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asn Gly Asn Asn Pro Ala
                        215
                                             220
cag atg aac gcg cgc gtc ggc tac tac aag cag tac tgc cag cag ctc
                                                                   720
Gln Met Asn Ala Arg Val Gly Tyr Tyr Lys Gln Tyr Cys Gln Gln Leu
                    230
cgc gtc gac cca ggg ccc aac ctc acc tgc tga
                                                                   753
Arg Val Asp Pro Gly Pro Asn Leu Thr Cys
                245
<210> 22
<211> 250
<212> PRT
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
<400> 22
Ser Met Gln Asn Cys Gly Cys Ala Ser Gly Leu Cys Cys Ser Arg Phe
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala
                            40
Asn Val Ala Ser Val Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Ser
Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala
Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser
                                    90
Gln Val Gln Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Ala Thr
                                105
                                                     110
His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn
                            120
Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln
                        135
                                             140
Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr
                    150
                                        155
Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro Gly
                                    170
```

185 Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr 200 Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asn Gly Asn Asn Pro Ala 215 220 Gln Met Asn Ala Arg Val Gly Tyr Tyr Lys Gln Tyr Cys Gln Gln Leu 230 235 Arg Val Asp Pro Gly Pro Asn Leu Thr Cys 245 <210> 23 <211> 774 <212> DNA <213> Artificial Sequence <223> Variant sequence produced by shuffling techniques <221> CDS <222> (1) ... (774) <400> 23 tcg atg cag aac tgc ggc tgc cag cca aac gta tgc tgc agc aag ttt 48 Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe ggc tac tgc ggc acg acc gac gag tac tgc ggc gac ggg tgc cag tcg 96 Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser gge eeg tge ege teg gge gge gge age agt gge gge gge gga gge 144 Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Gly Gly ggc gga ggc agt ggc ggt gcg aac gtg gct aat gtg gtc acc gac gcg 192 Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala 55 60 ttc ttc aac ggc atc aag aac cag gcc ggg agc tgg tgc gag ggc aag 240 Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Trp Cys Glu Gly Lys aac ttc tac acc cgg agc gcg ttc ctg agc gcc gtc aag gcg tac cca 288 Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro 85 90 ggc ttc gcc cat ggc ggg tcg cag gtg cag ggc aag cgc gag atc gcc 336 Gly Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala gcc ttc ttc gcg cat gtc acg cac gag acc ggg cat ttg tgc tac atc 384 Ala Phe Phe Ala His Val Thr His Glu Thr Gly His Leu Cys Tyr Ile aac gag gtc aac aag agc aac gcc tac tgc gac ccg acc aag agg cag 432 Asn Glu Val Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln tgg ccg tgc gcc gcg ggg cag aag tac tac ggg cgc ggc ccg ctg cag 480 Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln 150 155

Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe

160

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atc tcg tgg aac tac aac tac ggg ccc gcg ggg agg gcc atc ggc ttc
                                                                   528
Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe
                                    170
gac ggg ctg gga gac ccg gac aga ctg gcg cag gac ccc gtg ttg tcg
                                                                   576
Asp Gly Leu Gly Asp Pro Asp Arg Leu Ala Gln Asp Pro Val Leu Ser
            180
                                185
                                                     190
ttc aag tcg gcg ctc tgg ttc tgg atg aac aac gtg cac cgt gtg atg
                                                                   624
Phe Lys Ser Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met
        195
                            200
ccg cag ggc ttc ggc gcc acc atc agg gcc atc aac ggc gcc ctc gag
                                                                   672
Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu
                        215
tgc ggc ggg aac aac ccc gcc cag atg aac gcg cgc gtc ggc tac tac
                                                                   720
Cys Gly Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr
                    230
                                         235
agg cag tac tgc cgc cag ctc ggc gtc gac ccg ggc aac aac ctc acc
                                                                   768
Arg Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Asn Asn Leu Thr
                                    250
tgc tga
                                                                   774
Cys *
<210> 24
<211> 257
<212> PRT
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
                                25
Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Gly Gly
Gly Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala
                        55
Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Trp Cys Glu Gly Lys
                    70
                                         75
Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro
                85
                                     90
Gly Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala
            100
                                105
Ala Phe Phe Ala His Val Thr His Glu Thr Gly His Leu Cys Tyr Ile
                            120
Asn Glu Val Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln
                        135
                                             140
Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln
                    150
                                         155
Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe
                165
                                    170
Asp Gly Leu Gly Asp Pro Asp Arg Leu Ala Gln Asp Pro Val Leu Ser
            180
                                185
                                                     190
```

200 Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu 215 Cys Gly Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr 230 235 Arg Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Asn Asn Leu Thr 245 250 Cys <210> 25 <211> 765 <212> DNA <213> Artificial Sequence <223> Variant sequence produced by shuffling techniques <221> CDS <222> (1) ... (765) <400> 25 teg atg cag aac tge ggg tge geg teg gge etg tge tge age egg tte 48 Ser Met Gln Asn Cys Gly Cys Ala Ser Gly Leu Cys Cys Ser Arg Phe ggg tac tgc ggg acg ggc gag gac tac tgc ggc gcc ggg tgc cag tcg 96 Gly Tyr Cys Gly Thr Gly Glu Asp Tyr Cys Gly Ala Gly Cys Gln Ser 144 agt ggc ggt gcg aac gtg gct aat gtg gtc acc gac gcg ttc ttc aac 192 Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala Phe Phe Asn ggc atc aag aac cag gcc ggg agc ggg tgc gag ggc aag aac ttc tac 240 Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr 70 ace egg age geg tte etg age gee gte aag geg tae eea gge tte geg 288 Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala 90 cat ggc ggc tcc gag gtc gag cgc aag cgc gag att gcc gcc ttc ttc 336 His Gly Gly Ser Glu Val Glu Arg Lys Arg Glu Ile Ala Ala Phe Phe gcg cat gtc acg cac gag acc ggg cat ttc tgc tac atc agc gag atc Ala His Val Thr His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile aac aag agc aac gcc tac tgc gac ccg acc aag agg cag tgg ccg tgc 432 Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys gcc gcg ggg cag aag tac tac ggc cgc ggc ccg ctg cag atc tcc tgg 480 Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp 145 155

Phe Lys Ser Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met

```
aac tac aac tac ggg ccc gcg ggg agg gcc atc ggc ttc gac ggg ctg
                                                                   528
Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu
                165
gga gac ccg gac aga ctg gcg cag gac ccc gtg ttg tcg ttc aag gcg
                                                                    576
Gly Asp Pro Asp Arg Leu Ala Gln Asp Pro Val Leu Ser Phe Lys Ala
            180
                                185
                                                     190
gcg ctc tgg ttc tgg atg aac aac gtg cac cgt gtg atg ccg cag ggc
                                                                    624
Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly
        195
                            200
                                                 205
tte gge gee ace ate agg gee ate aac gge gee ete gag tge aac ggg
                                                                    672
Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asn Gly
    210
                        215
aac aac ccc gcc cag atg aac gcg cgc gtc ggc tac tac agg cag tac
                                                                    720
Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr Arg Gln Tyr
                    230
tgc cgc cag ctc ggc gtc gac ccg ggc aac aac ctc acc tgc tga
                                                                    765
Cys Arg Gln Leu Gly Val Asp Pro Gly Asn Asn Leu Thr Cys
<210> 26
<211> 254
<212> PRT
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<213> Artificial Sequence

<220>

<223> Variant sequence produced by shuffling techniques

<400> 26

Ser Met Gln Asn Cys Gly Cys Ala Ser Gly Leu Cys Cys Ser Arg Phe Gly Tyr Cys Gly Thr Gly Glu Asp Tyr Cys Gly Ala Gly Cys Gln Ser 25 35 40 Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala Phe Phe Asn 55 Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr 70 75 Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala 85 90 His Gly Gly Ser Glu Val Glu Arg Lys Arg Glu Ile Ala Ala Phe Phe 105 Ala His Val Thr His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile 120 Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys 135 Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu 170 Gly Asp Pro Asp Arg Leu Ala Gln Asp Pro Val Leu Ser Phe Lys Ala 185 Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asn Gly

210 Asn Asn Pro 225	Ala Gln Met	215 Asn Ala Arg		220 Tyr Tyr Arg	Gln Tyr 240
		Asp Pro Gly		Leu Thr Cys	240
<210> 27 <211> 753 <212> DNA <213> Artifi	icial Sequen	ce			
<220> <223> Variar	nt sequence	produced by	shuffling	techniques	
<221> CDS <222> (1)	. (753)				
		tgc cag cca Cys Gln Pro			_
		gac gcc tac Asp Ala Tyr 25	Cys Gly		
		ggc ggc ggc Gly Gly Gly 40			
		acc ggc tcc Thr Gly Ser 55			
		gag ggc aag Glu Gly Lys			
	Ala Val Lys	gcg tac cca Ala Tyr Pro	Gly Phe		
		gag att gcc Glu Ile Ala 105	Ala Phe		
		tgc tac atc Cys Tyr Ile 120			
		aag agg cag Lys Arg Glm 135	Trp Pro		
_		ccg ctg cag Pro Leu Gln	_		
		atc ggc ttc Ile Gly Phe			

```
agg gtg gcg cgg gac gcc gtg gtg gcg ttc aag gcg gcg ctc tgg ttc
                                                                   576
Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe
tgg atg aac aac gtg cac cgt gtg atg ccg cag ggc ttc ggc gcc acc
                                                                   624
Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr
ate agg gee ate aac gge gee ete gag tge gae gge aag aac eee aac
                                                                   672
Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asp Gly Lys Asn Pro Asn
    210
                        215
tcc gtc aac aac cgc gtc gcc tac tac aag cag ttc tgc cag gat ttc
                                                                   720
Ser Val Asn Asn Arg Val Ala Tyr Tyr Lys Gln Phe Cys Gln Asp Phe
                    230
                                        235
                                                                   753
ggc gtc gac cca ggg ccc aac ctt act tgc tga
Gly Val Asp Pro Gly Pro Asn Leu Thr Cys *
                245
<210> 28
<211> 250
<212> PRT
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Phe Cys Cys Ser Lys Phe
                                    10
Gly Tyr Cys Gly Thr Thr Asp Ala Tyr Cys Gly Asp Gly Cys Gln Ser
                                25
Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala
                            40
Asn Val Ala Ser Val Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Ser
                        55
Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala
                    70
                                        75
Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser
                85
                                    90
Glu Val Glu Arg Lys Arg Glu Ile Ala Ala Phe Phe Ala His Val Thr
                                105
His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn
                            120
                                                 125
Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln
                        135
                                             140
Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr
                    150
                                        155
Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro Gly
                165
                                    170
Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe
                                185
Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr
                            200
Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asp Gly Lys Asn Pro Asn
                        215
Ser Val Asn Asn Arg Val Ala Tyr Tyr Lys Gln Phe Cys Gln Asp Phe
                    230
                                         235
Gly Val Asp Pro Gly Pro Asn Leu Thr Cys
                245
```

```
<210> 29
<211> 774
<212> DNA
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1)...(774)
<400> 29
tcg atg cag aac tgc ggc tgc cag cca aac gta tgc tgc agc aag ttt
                                                               48
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
                                   10
ggc tac tgc ggc acg acc gac gag tac tgc ggc gac ggg tgc cag tcg
                                                               96
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
            20
144
35
ggc gga ggc agt ggc ggt gcg aac gtg gct aat gtg gtc acc gac gcg
                                                               192
Gly Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala
tto tto aac ggo ato aag aac cag goo ggg ago ggg tgo gag ggo aag
                                                               240
Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys
aac ttc tac acc egg age geg ttc etc gag gec atc gec geg tac eeg
                                                               288
Asn Phe Tyr Thr Arg Ser Ala Phe Leu Glu Ala Ile Ala Ala Tyr Pro
ggc ttc gcg cat ggc ggc tcc gag gtc gag cgc aag cgc gag att gcc
                                                               336
Gly Phe Ala His Gly Gly Ser Glu Val Glu Arg Lys Arg Glu Ile Ala
           100
                                                 110
gcc ttc ttc gcg cac gcc acg cac gag acc ggg cat ttc tgc tac atc
                                                               384
Ala Phe Phe Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile
       115
                          120
age gag gte aac aag age aac gee tac tge gae eeg ace aag agg cag
                                                               432
Ser Glu Val Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln
   130
                      135
tgg ccg tgc gcc gcg ggg cag aag tac tac ggg cgc ggc ccg ctg cag
                                                               480
Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln
145
                   150
atc tcg tgg aac tac aac tac ggg ccc gcg ggg agg gcc atc ggc ttc
                                                               528
Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe
gac ggg etc ggg gac ecc ggc agg gtg geg egg gac gec gtg gtg geg
                                                               576
Asp Gly Leu Gly Asp Pro Gly Arg Val Ala Arg Asp Ala Val Val Ala
           180
ttc aag gcg gcg ctc tgg ttc tgg atg aac aac gtg cac cgt gtg atg
                                                               624
Phe Lys Ala Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met
```

```
195
                            200
                                                 205
ccg cag ggc ttc ggc gcc acc atc agg gcc atc aac ggc gcc ctc gag
                                                                   672
Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu
    210
                        215
tgc ggc ggg aac aac ccc gcc cag atg aac gcg cqc gtc ggc tac tac
                                                                   720
Cys Gly Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr
aag cag tac tgc cgc cag ctc ggc gtc gac cca ggg ccc aac ctc act
                                                                   768
Lys Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr
                245
tgc tga
                                                                   774
Cys *
<210> 30
<211> 257
<212> PRT
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
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Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser 25 40 Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala 55 60 Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys 70 75 Asn Phe Tyr Thr Arg Ser Ala Phe Leu Glu Ala Ile Ala Ala Tyr Pro 85 90 Gly Phe Ala His Gly Gly Ser Glu Val Glu Arg Lys Arg Glu Ile Ala 105 110 Ala Phe Phe Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile 120 Ser Glu Val Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln 135 140 Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln 150 155 Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe 165 170 Asp Gly Leu Gly Asp Pro Gly Arg Val Ala Arg Asp Ala Val Val Ala 185 Phe Lys Ala Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met 200 Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu 215 Cys Gly Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr 235 Lys Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr 245

Cys

```
<210> 31
<211> 753
<212> DNA
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1) ... (753)
<400> 31
tcg atg cag aac tgc ggc tgc cag cca aac ttc tgc tgc agc aag ttt
                                                                   48
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Phe Cys Cys Ser Lys Phe
                                     10
gge tae tge gge aeg aee gae gag tae tge gge gee ggg tge eag teg
                                                                   96
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Ala Gly Cys Gln Ser
gge eeg tge ege teg gge gge gge age agt gge gge ggt ggt geg
                                                                   144
Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala
aac gtg gct agc gtc gtc acc ggc tcc ttc ttc aac ggc atc aag aac
                                                                   192
Asn Val Ala Ser Val Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Asn
cag gcc ggg agc ggg tgc gag ggc aag aac ttc tac acc cgg agc gcg
                                                                   240
Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala
65
                     70
ttc ctg age gee gtc aag geg tac cca gge ttc gee cat gge gge tee
                                                                   288
Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser
                                     90
                                                          95
gag gtc gag cgc aag cgc gag atc gcc gcc ttc ttc gcg cac gcc acg
                                                                   336
Glu Val Glu Arg Lys Arg Glu Ile Ala Ala Phe Phe Ala His Ala Thr
            100
                                105
cat gag acc ggg cat ttc tgc tac atc agc gag atc aac aag agc aac
                                                                   384
His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn
        115
gee tae tge gae eeg aee aag agg eag tgg eeg tge gee geg ggg eag
                                                                   432
Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln
    130
aag tac tac ggg cgc ggc ccg ctg cag atc tcg tgg aac tac aac tac
Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr
145
                    150
ggg ccc gcg ggg agg gcc atc ggc ttt gac ggg ctc ggg gac ccc ggc
                                                                   528
Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro Gly
                                                         175
agg gtg gcg cag gac ccc gtg ctg gcg ttc aag gcg gcg ctc tgg ttc
                                                                   576
Arg Val Ala Gln Asp Pro Val Leu Ala Phe Lys Ala Ala Leu Trp Phe
tgg atg aac agc gtg cac ggg gtg gtg ccg cag ggc ttc ggc gcc acc
                                                                   624
Trp Met Asn Ser Val His Gly Val Val Pro Gln Gly Phe Gly Ala Thr
```

195 200 205

```
ate agg gee ate aac gge gee ete gag tge aac ggg aac aac eec gee
                                                                   672
Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asn Gly Asn Asn Pro Ala
    210
                        215
cag atg aac gcg cgc gtc ggc tac tac aag cag ttc tgc cag gat ttc
                                                                   720
Gln Met Asn Ala Arg Val Gly Tyr Tyr Lys Gln Phe Cys Gln Asp Phe
ggc gtc gac cca ggg ccc aac ctc act tgc tga
                                                                   753
Gly Val Asp Pro Gly Pro Asn Leu Thr Cys
                245
<210> 32
<211> 250
<212> PRT
<213> Artificial Sequence
<220>
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<223> Variant sequence produced by shuffling techniques

Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Phe Cys Cys Ser Lys Phe Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Ala Gly Cys Gln Ser Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala 40 Asn Val Ala Ser Val Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala 75 Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser 90 Glu Val Glu Arg Lys Arg Glu Ile Ala Ala Phe Phe Ala His Ala Thr 105 His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn 120 Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln 135 140 Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr 150 155 Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro Gly 165 170 Arg Val Ala Gln Asp Pro Val Leu Ala Phe Lys Ala Ala Leu Trp Phe 185 Trp Met Asn Ser Val His Gly Val Val Pro Gln Gly Phe Gly Ala Thr 200 Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asn Gly Asn Asn Pro Ala 215 220 Gln Met Asn Ala Arg Val Gly Tyr Tyr Lys Gln Phe Cys Gln Asp Phe 230 235 Gly Val Asp Pro Gly Pro Asn Leu Thr Cys 245

<210> 33

<211> 774

<212> DNA

<213> Artificial Sequence

<220> <223> Variant sequence produced by shuffling techniques <221> CDS <222> (1) ... (774) <400> 33 tcg atg cag aac tgc ggc tgc cag cca aac gta tgc tgc agc aaq ttt 48 Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe gge tac tgc ggc aca acc gac gag tac tgc ggc gac ggg tgc cag tcg 96 Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser 144 40 ggc gga ggc agt ggc ggt gcg aac gtg gct aat gtg gtc acc gac gcg 192 Gly Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala 55 ttc ttc aac ggc atc aag aac cag gcc ggg agc ggg tgc gag ggc aag 240 Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys 70 aac ttc tac acc cgg agc gcg ttc ctc gag gcc atc gcc gcg tac ccg 288 Asn Phe Tyr Thr Arg Ser Ala Phe Leu Glu Ala Ile Ala Ala Tyr Pro gge ttc gcg cat ggc ggc tcc gag gtc gag cgc aag cgc gag att gcc 336 Gly Phe Ala His Gly Gly Ser Glu Val Glu Arg Lys Arg Glu Ile Ala gcc ttc ttc gcg cac gcc acg cac gag acc ggg cat ttc tgc tac atc 384 Ala Phe Phe Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile 115 age gag gte aac aag age aac gee tae tge gae eeg ace aag agg eag 432 Ser Glu Val Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln 130 tgg ccg tgc gcc gcg ggg cag aag tac tac ggg cgc ggc ccg ctg cag 480 Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln 145 atc tcg tgg aac tac aac tac ggg ccc gcg ggg agg gcc atc ggc ttc Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe 165 170 175 gac ggg ctc ggg gac ccc ggc agg gtg gcg cgg gac gcc gtg gtg gcg 576 Asp Gly Leu Gly Asp Pro Gly Arg Val Ala Arg Asp Ala Val Val Ala 180 ttc aag gcg gcg ctc tgg ttc tgg atg aac aac gtg cac cgt gtg atg 624 Phe Lys Ala Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met 195 ccg cag ggc ttc ggc gcc acc atc agg gcc atc aac ggc gcc ctc gag 672 Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu 210

```
tgc ggc ggg aac aac ccc gcc cag atg aac gcg cgc gtc ggc tac tac
                                                                720
Cys Gly Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr
225
aag cag tac tgc cgc cag ctc ggc gtc gac cca ggg ccc aac ctc act
                                                                768
Lys Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr
tgc tga
                                                                774
Cys *
<210> 34
<211> 257
<212> PRT
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
40
Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala
                       55
                                          60
Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys
                   70
                                      75
Asn Phe Tyr Thr Arg Ser Ala Phe Leu Glu Ala Ile Ala Ala Tyr Pro
               85
                                   90
Gly Phe Ala His Gly Gly Ser Glu Val Glu Arg Lys Arg Glu Ile Ala
                               105
                                                  110
Ala Phe Phe Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile
                           120
                                              125
Ser Glu Val Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln
                       135
                                          140
Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln
                   150
                                      155
Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe
               165
                                  170
Asp Gly Leu Gly Asp Pro Gly Arg Val Ala Arg Asp Ala Val Val Ala
                               185
Phe Lys Ala Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met
       195
                           200
Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu
                       215
Cys Gly Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr
                   230
                                      235
Lys Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr
```

<210> 35

<211> 753

<212> DNA

<213> Artificial Sequence

	<220> <223> Variant sequence produced by shuffling techniques															
	<221> CDS <222> (1)(753)															
<400: tcg a Ser N	atg	cag														48
ggc t																96
ggc o																144
aac q Asn '																192
cag g Gln 2 65														_		240
ttc (288
gag g Glu		_		_	_			_	_					_	_	336
cac (_	_		384
gcc (Ala (432
aag Lys 145				_		_	_	_		_						480
gjå : aaa :																528
agg (576
tgg a																624
		195					200					205				
atc a																672

210 215 220

```
cag atg aac gcg cgc gtc ggc tac tac aag cag tac tgc cag cag ctc
                                                                  720
Gln Met Asn Ala Arg Val Gly Tyr Tyr Lys Gln Tyr Cys Gln Gln Leu
cgc gtc gac cca ggg ccc aac ctc act tgc tga
                                                                  753
Arg Val Asp Pro Gly Pro Asn Leu Thr Cys *
                245
<210> 36
<211> 250
<212> PRT
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Phe Cys Cys Ser Lys Phe
                                    10
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Val
                            40
Asn Val Ala Ser Val Val Thr Asp Ser Phe Phe Asn Gly Ile Lys Ser
                        55
Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala
                                        75
Phe Leu Ser Ala Val Asn Ala Tyr Pro Gly Phe Ala His Gly Gly Thr
                                    90
Glu Val Glu Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Ala Thr
                                105
His Glu Thr Gly His Phe Cys Tyr Ile Asn Glu Ile Asn Lys Ser Asn
                                                125
                            120
Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln
                        135
                                            140
Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr
                    150
                                        155
Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro Gly
                165
                                    170
Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe
                                185
Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr
                            200
Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asn Gly Asn Asn Pro Ala
                        215
                                            220
Gln Met Asn Ala Arg Val Gly Tyr Tyr Lys Gln Tyr Cys Gln Gln Leu
                    230
                                        235
Arg Val Asp Pro Gly Pro Asn Leu Thr Cys
                245
<210> 37
<211> 774
<212> DNA
<213> Artificial Sequence
<220>
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<223> Variant sequence produced by shuffling techniques

<221> CDS <222> (1)...(774)

<400> 37 tcq atq caq aac tgc qqc tqc caq cca aac qta tqc tqc aqc aaq ttt Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe 10 gge tac tgc ggc acg acc gac gag tac tgc ggc gac ggg tgc cag tcg 96 Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser 144 40 ggc gga ggc agt ggc ggt gcg aac gtg gct aat gtg gtc acc gac gcg 192 Gly Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala 55 tto tto aac ggc atc aag aac cag gcc ggg agc ggg tgc gag ggc aag 240 Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys 70 aac ttc tac acc cgg aga gcg ttc ctg agc gcc gtc aag gcg tac cca 288 Asn Phe Tyr Thr Arg Arg Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro ggc ttc gcc cat ggc ggg tcg cag gtg cag ggc aag cgc gag atc gcc 336 Gly Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala 105 gcc ttc ttc gcg cac gcc acg cac gag acc ggg cat ttc tgc tac atc 384 Ala Phe Phe Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile 115 120 age gag ate aac aag age aac gee tae tge gae eeg ace aag agg cag 432 Ser Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln 130 tgg ccg tgc gcc gcg ggg cag aag tac tac ggg cgc ggc ccg ctg cag 480 Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln 145 atc tcg tgg aac tac aac tac ggg ccc gcc ggg agg gac atc ggc ttc 528 Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Asp Ile Gly Phe 165 170 175 aac ggg ctc gcc gac ccc aac agg gtg gcg cag gac gcc gtg gtg gcg 576 Asn Gly Leu Ala Asp Pro Asn Arg Val Ala Gln Asp Ala Val Val Ala 180 ttc aag gcg gcg ctc tgg ttc tgg atg aac agc gtg cac ggg gtg gtg 624 Phe Lys Ala Ala Leu Trp Phe Trp Met Asn Ser Val His Gly Val Val 195 ccg cag ggg ttc ggc gcc acc acc agg gcc atc aac ggc gcc ctc gag Pro Gln Gly Phe Gly Ala Thr Thr Arg Ala Ile Asn Gly Ala Leu Glu 210

```
tgc aac ggg aac aac ccc gcc cag atg aac gcg cgc gtc ggc tac tac
                                                                720
Cys Asn Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr
agg cag tac tgc cgc cag ctc ggc gtc gac cca ggg ccc aac ctc act
                                                                768
Arg Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr
               245
tgc tga
                                                                774
Cys *
<210> 38
<211> 257
<212> PRT
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
                                   10
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
                               25
40
Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala
                       55
                                          60
Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys
                   70
                                      75
Asn Phe Tyr Thr Arg Arg Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro
               85
                                   90
Gly Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala
                              105
                                                  110
Ala Phe Phe Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile
                           120
Ser Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln
                       135
                                          140
Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln
                   150
                                      155
Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Asp Ile Gly Phe
               165
                                   170
Asn Gly Leu Ala Asp Pro Asn Arg Val Ala Gln Asp Ala Val Val Ala
                               185
Phe Lys Ala Ala Leu Trp Phe Trp Met Asn Ser Val His Gly Val Val
                           200
Pro Gln Gly Phe Gly Ala Thr Thr Arg Ala Ile Asn Gly Ala Leu Glu
                       215
Cys Asn Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr
                                      235
Arg Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr
               245
Cys
```

<210> 39 <211> 780 <212> DNA

<213> Artificial Sequence

<220> <223> Variant sequence produced by shuffling techniques
<221> CDS <222> (1)(780)
<pre><400> 39 tcg atg cag aac tgc ggc tgc cag cca aac gta tgc tgc agc aag ttc 48 Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe</pre>
ggc tac tgc ggc acg acc gac gag tac tgc ggc gac ggg tgc cag tcg 96 Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser 20 25 30
ggc ccg tgc cac tcg ggc ggc ggc ggc agc tgt ggc ggc ggt ggc ggc 144 Gly Pro Cys His Ser Gly Gly Gly Gly Ser Cys Gly Gly Gly Gly Gly 35 40 45
ggc agc ggc gga ggc agt ggc ggt gcg aac gtg gct aat gtg gtc acc 192 Gly Ser Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr 50 55 60
ggc tcc ttc ttc aac ggc atc aag aac cag gcc ggg agc ggg tgc gag 240 Gly Ser Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu 65 70 75 80
ggc aag aac ttc tac acc cgg agc gcg ttc ctg agc gcc gtc aag gcg 288 Gly Lys Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala 85 90 95
tac cca ggc ttc gcc cat ggc ggg tca cag gtg cag ggc aag cgc gag 336 Tyr Pro Gly Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu 100 105 110
atc gcc gcc ttc ttc gcg cat gtc acg cac gag acc ggg cat ttc tgc 384 Ile Ala Ala Phe Phe Ala His Val Thr His Glu Thr Gly His Phe Cys 115 120 125
tac atc agc gag atc aac aag agc aac gcc tac tgc gac ccg acc aag Tyr Ile Ser Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys 130 135 140
agg cag tgg ccg tgc gcc gcg ggg cag aag tac tac ggg cgc ggc ccg 480 Arg Gln Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro 145 150 155 160
ctg cag atc tcg tgg aac tac aac tac ggg ccc gcg ggg agg gcc atc 528 Leu Gln Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile 165 170 175
ggc ttc gac ggg ctc ggg gac ccc ggc agg gtg gcg cag gac gcc gtg 576 Gly Phe Asp Gly Leu Gly Asp Pro Gly Arg Val Ala Gln Asp Ala Val 180 185 190
atc gcg ttc aag tcg gcg ctc tgg tac tgg atg gag aac atg cac cag 1le Ala Phe Lys Ser Ala Leu Trp Tyr Trp Met Glu Asn Met His Gln 195 200 205
ctc atg ccc cag ggc ttc ggc gcc acc atc agg gcc atc aac ggc gcc 672 Leu Met Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala 210 215 220

```
ctc qag tgc ggc ggg aac aac ccc gcc cag atg aac gcg cgc gtc ggc
                                                                   720
Leu Glu Cys Gly Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly
225
                    230
tac tac aag cag tac tgc cac cag ctc ggc gtc gac cca ggg ccc aac
                                                                   768
Tyr Tyr Lys Gln Tyr Cys His Gln Leu Gly Val Asp Pro Gly Pro Asn
                245
                                    250
ctc act tgc tga
                                                                   780
Leu Thr Cys *
<210> 40
<211> 259
<212> PRT
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
<400> 40
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
                                    10
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
                                25
Gly Pro Cys His Ser Gly Gly Gly Gly Ser Cys Gly Gly Gly Gly Gly
                            40
Gly Ser Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr
                        55
Gly Ser Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu
                    70
                                        75
Gly Lys Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala
                85
                                    90
Tyr Pro Gly Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu
                                105
Ile Ala Ala Phe Phe Ala His Val Thr His Glu Thr Gly His Phe Cys
                            120
                                                 125
Tyr Ile Ser Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys
                        135
Arg Gln Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro
                                        155
Leu Gln Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile
                                    170
Gly Phe Asp Gly Leu Gly Asp Pro Gly Arg Val Ala Gln Asp Ala Val
                                185
Ile Ala Phe Lys Ser Ala Leu Trp Tyr Trp Met Glu Asn Met His Gln
                            200
Leu Met Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala
                        215
                                             220
Leu Glu Cys Gly Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly
                    230
                                        235
Tyr Tyr Lys Gln Tyr Cys His Gln Leu Gly Val Asp Pro Gly Pro Asn
                245
                                    250
Leu Thr Cys
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<210> 41

<211> 771

<212> DNA

<213> Artificial Sequence

<22 <22	0 > 3 > Va	riar	nt se	equer	nce p	rodu	ıced	by s	shuff	ling	g teo	chnic	Iues			
	1> CI 2> (1		(771	L)												
tcg	0> 4] atg Met	cag														48
	tac Tyr															96
	ccg Pro															144
	ggc Gly 50	_						_	_	_	_					192
	agc Ser			_		_	_		_		_			_		240
	tac Tyr															288
	gcc Ala															336
	ctc Leu				_							_			_	384
	atc Ile 130															432
	tgc Cys															480
	tgg Trp															528
	ctc Leu		_							_	_					576
	gcg Ala															624
_	gly			_				_							_	672

210 215 220

gac ggg aac aac ccc gcc cag atg aac gcg cgc gtc ggc tac tac aag 720 Asp Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr Lys 225 230 cag tac tgc cag cag ctc cgc gtc gac ccg ggc aac aac ctc act tgc 768 Gln Tyr Cys Gln Gln Leu Arg Val Asp Pro Gly Asn Asn Leu Thr Cys 771 tga <210> 42 <211> 256 <212> PRT <213> Artificial Sequence <220> <223> Variant sequence produced by shuffling techniques <400> 42 Ser Met Gln Asn Cys Gly Cys Ala Ser Gly Met Cys Cys Ser Arg Phe Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser 25 40 Gly Gly Ser Gly Gly Ala Asn Val Ala Ser Val Val Thr Gly Ser Phe 55 Phe Ser Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn 70 75 Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly 90 Phe Ala His Gly Gly Thr Glu Val Glu Gly Lys Arg Glu Ile Ala Ala 105 Phe Leu Ala His Ile Thr His Glu Thr Gly His Phe Cys Tyr Ile Ser 120 125 Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp 135 Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile 155 Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Leu Asp 170 Gly Leu Gly Asp Pro Gly Arg Val Ala Arg Asp Ala Val Val Ala Phe 185 Lys Ala Ala Leu Trp Phe Trp Met Asn Ser Val His Gly Val Met Pro 200 Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys 220 Asp Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr Lys

250

235

Gln Tyr Cys Gln Gln Leu Arg Val Asp Pro Gly Asn Asn Leu Thr Cys

<210> 43

<211> 753

<212> DNA

<213> Artificial Sequence

<220> <223> Variant sequence produced by shuffling techniques															
<221> CDS <222> (1)(<221> CDS <222> (1)(753) <400> 43														
<400> 43 tcg atg cag a Ser Met Gln A 1		-													
ggc tac tgc g Gly Tyr Cys G															
ggc ccg tgc c Gly Pro Cys A 35															
aac gtg gct a Asn Val Ala A 50															
cag gcc ggg a Gln Ala Gly S 65															
ttc ctg agc g Phe Leu Ser A															
gag gtc gag c Glu Val Glu A 1			-												
cac gag acc g His Glu Thr G 115		-	Ser Glu Ile												
gcc tac tgc g Ala Tyr Cys A 130															
aag tac tac g Lys Tyr Tyr G 145															
ggg ccc gcg g Gly Pro Ala G															
agg gtg gcg c Arg Val Ala A 1															
tgg atg aac a Trp Met Asn A 195			Pro Gln Gly												
atc agg gcc a Ile Arg Ala I															

210 215 220 cag atg aac gcg cgc gtc ggc tac tac aag cag tac tgc cgc cag ctc 720 Gln Met Asn Ala Arg Val Gly Tyr Tyr Lys Gln Tyr Cys Arg Gln Leu 230 ggc gtc gac cca ggg ccc aac ctc act tgc tga 753 Gly Val Asp Pro Gly Pro Asn Leu Thr Cys 245 <210> 44 <211> 250 <212> PRT <213> Artificial Sequence <220> <223> Variant sequence produced by shuffling techniques Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala 40 Asn Val Ala Asn Val Val Thr Asp Ala Phe Phe Asn Gly Ile Lys Asn 55 Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala 70 75 Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser 85 90 95 Glu Val Glu Arg Lys Arg Glu Ile Ala Ala Phe Phe Ala His Val Thr 105 His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn 120 125 Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln

165 170 175
Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe
180 185 190

Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr

Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro Gly

140

155

135

150

180 185 190

Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr

195 200 205 Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Gly Gly Asn Asn Pro Ala

210 215 220

Gln Met Asn Ala Arg Val Gly Tyr Tyr Lys Gln Tyr Cys Arg Gln Leu
225 230 235 240

Gly Val Asp Pro Gly Pro Asn Leu Thr Cys 245 250

<210> 45

<211> 774

<212> DNA

<213> Artificial Sequence

<220>

<223> Variant sequence produced by shuffling techniques

<221> CDS

<222> (1) ... (774)

<400> 45				
tcg atg cag Ser Met Gln 1				
ggc tac tgc Gly Tyr Cys	Asp Glu T			
ggc ccg tgc Gly Pro Cys 35	 			
ggc gga ggc Gly Gly Gly 50				
	s Asn Gln A		ggg tgc gag Gly Cys Glu	
aac ttc tac Asn Phe Tyr			gtc aag gcg Val Lys Ala	
	/ Ser Gln V		aag cgc gag Lys Arg Glu 110	
			cat ttc tgc His Phe Cys 125	
		Tyr Cys Asp	ccg acc aag Pro Thr Lys 140	
	 Gln Lys T		cgc ggc ccg Arg Gly Pro	
			agg gcc atc Arg Ala Ile	
	Asn Arg V		gac gcc gtg Asp Ala Val 190	
			gtg cac ggg Val His Gly 205	
		Arg Ala Ile	aac ggc gcc Asn Gly Ala 220	
	Ala Gln M		cgc gtc ggc Arg Val Gly	

```
aag cag tac tgc cgc cag ctc ggc gtc gac cca ggg ccc aac ctc act
Lys Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr
tgc tga
Cys *
<210> 46
<211> 257
<212> PRT
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Arg Phe
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Arg Ser
40
Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala
                       55
Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys
                                       75
Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro
                                   90
Gly Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala
                               105
                                                   110
Ala Phe Phe Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile
        115
                           120
                                               125
Ser Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln
                       135
                                           140
Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln
                   150
                                       155
Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe
               165
                                   170
Asp Gly Leu Gly Asp Pro Asn Arg Val Ala Arg Asp Ala Val Val Ala
           180
                               185
                                                   190
Phe Lys Ala Ala Leu Trp Phe Trp Met Asn Ser Val His Gly Val Val
        195
                           200
Pro Gln Gly Phe Gly Ala Thr Thr Arg Ala Ile Asn Gly Ala Leu Glu
                       215
Cys Asn Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr
                   230
                                       235
Lys Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr
                                   250
Cys
<210> 47
<211> 771
<212> DNA
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
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<221> CDS

<222> (1)...(771)

<400)> 47	7														
_	_	_		_		_	_			_	_	_	_	aag Lys 15		48
														cag Gln		96
														ggc Gly		144
										_	_			tcc Ser		192
														aag Lys		240
														cca Pro 95		288
														gcc Ala		336
														atc Ile		384
	_		_	_		_		_	_	_		_		cag Gln		432
														cag Gln		480
														ttt Phe 175		528
														gcg Ala		576
														atg Met		624
														gag Glu		672
ggc Gly 225	gly ggg	aac Asn	aac Asn	ccc Pro	gcc Ala 230	cag Gln	atg Met	aac Asn	gcg Ala	cgc Arg 235	gtc Val	ggc Gly	tac Tyr	tac Tyr	agg Arg 240	720

```
cag tac tgc cgc cag ctc ggc gtc gac cca ggg ccc aac ctc act tgc
                                                                768
Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr Cys
                                                                771
tga
<210> 48
<211> 256
<212> PRT
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
                               25
Gly Gly Ser Gly Gly Ala Asn Val Ala Ser Val Val Thr Gly Ser Phe
                       55
Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn
                   70
Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly
               85
                                   90
Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala Ala
            100
                               105
Phe Phe Ala His Val Thr His Glu Thr Gly His Phe Arg Tyr Ile Ser
                           120
Glu Val Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp
                       135
Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile
                                       155
Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp
                                   170
Gly Leu Gly Asp Pro Gly Arg Val Ala Arg Asp Ala Val Val Ala Phe
                               185
Lys Ala Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met Pro
                           200
        195
Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys
                       215
                                           220
Gly Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr Arg
                                       235
                   230
Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr Cys
               245
                                   250
<210> 49
<211> 753
<212> DNA
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1) ... (753)
```

<400)> 49	•													
								aac Asn 10							48
		_		_		_		tgc Cys		_		_	_	_	96
								agc Ser							144
								ttc Phe							192
								aac Asn							240
	_	_	_	_	_			ggc Gly 90		_				_	288
								gcc Ala							336
						_		agc Ser			_	_			384
_		_	_	_		_	 _	tgg Trp	_	_	_			_	432
								atc Ile							480
								gac Asp 170							528
								ttc Phe							576
								ccg Pro							624
								tgc Cys							672
								aag Lys							720
				Gly 999				tgc Cys	tga *						753

```
<210> 50
<211> 250
<212> PRT
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
<400> 50
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
                                25
Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Val
                            40
Asn Val Ala Ser Ile Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Asn
                        55
Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala
                    70
                                        75
Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Thr
                                    90
Glu Val Glu Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Val Thr
                                105
                                                    110
His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Ser Lys Ser Asn
                            120
                                                 125
Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln
                        135
                                             140
Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr
                    150
                                        155
Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro Gly
                165
                                    170
Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe
            180
                                185
Trp Met Asn Ser Val His Gly Val Ala Pro Gln Gly Phe Gly Ala Thr
                            200
Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Gly Gly Asn Asn Pro Ala
                        215
                                             220
Gln Met Asn Ala Arg Val Gly Tyr Tyr Lys Gln Tyr Cys His Gln Leu
                    230
Gly Val Asp Pro Gly Pro Asn Leu Thr Cys
                245
<210> 51
<211> 753
<212> DNA
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1) ... (753)
<400> 51
tcg atg cag aac tgc ggc tgc cag cca aac gta tgc tgc agc aag ttt
                                                                   48
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
ggc tac tgc ggc acg acc gac gag tac tgc ggc gac ggg tgc cag tcg
                                                                   96
```

Gly	Tyr	Cys	Gly 20	Thr	Thr	Asp	Glu	Tyr 25	Cys	Gly	Asp	Gly	Cys 30	Gln	Ser	
														ggt Gly		144
														aag Lys		192
														agc Ser		240
	_	_	_	_	_						_			999 Gly 95	_	288
_		_		_	_			_	_					gtc Val	_	336
														agc Ser		384
														gly ggg		432
_				_		_	_	_		_				aac Asn		480
														ccc Pro 175		528
			Arg	Asp	Ala	Val		Ala	Phe	Lys	Ala			tgg Trp		576
														gcc Ala		624
														ccc Pro		672
														cag Gln		720
	_	_					ctc Leu		_	tga *						753

<210> 52 <211> 250 <212> PRT

<213> Artificial Sequence

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<220>
<223> Variant sequence produced by shuffling techniques
<400> 52
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala
                            40
Asn Val Ala Ser Val Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Ser
Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala
                                        75
Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser
                                    90
Gln Val Gln Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Val Thr
                                105
His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn
                            120
                                                125
Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln
                        135
                                            140
Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr
                    150
                                        155
Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro Gly
                165
                                    170
Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe
            180
                                185
Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr
        195
                            200
Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Gly Gly Asn Asn Pro Ala
                        215
                                            220
Gln Met Asn Ala Arg Val Gly Tyr Tyr Arg Gln Tyr Cys Arg Gln Leu
                    230
Gly Val Asp Pro Gly Pro Asn Leu Thr Cys
                245
<210> 53
<211> 753
<212> DNA
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1) ... (753)
<400> 53
tcg atg cag aac tgc ggc tgc cag cca aac gta tgc tgc agc aag ttt
                                                                   48
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
ggc tac tgc ggc acg acc gac gag tac tgc ggc gcc ggg tgc cag tcg
                                                                   96
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Ala Gly Cys Gln Ser
             20
ggc ccg tgc cac tcg ggc ggc ggc ggc agc agt ggc ggc ggt ggt gcg
                                                                   144
Gly Pro Cys His Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala
```

35 40 45

					acc Thr 55							192
_	_		_	 _	gag Glu	 _					_	 240
					gcg Ala							288
					gag Glu							336
					tgc Cys							384
					aag Lys 135							432
					ccg Pro							480
		_		 _	atc Ile				_	_		528
					gtg Val							576
					cgt Arg							624
					gcc Ala 215							672
					ggc Gly							720
	_	_			aac Asn		_	tga *				753

<210> 54

<211> 250

<212> PRT

<213> Artificial Sequence

<220>

```
<223> Variant sequence produced by shuffling techniques
<400> 54
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Ala Gly Cys Gln Ser
                               25
Gly Pro Cys His Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala
                           40
Asn Val Ala Ser Val Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Asn
                       55
Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala
                   70
                                       75
Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser
                                   90
Gln Val Gln Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Val Thr
                               105
His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn
                           120
Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln
                       135
Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Leu Ser Trp Asn Tyr Asn Tyr
                   150
                                       155
Gly Pro Ala Gly Arg Asp Ile Gly Phe Asn Gly Leu Ala Asp Pro Asn
               165
                                   170
Arg Val Ala Gln Asp Ala Val Ile Ala Phe Lys Ser Ala Leu Trp Phe
                               185
Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr
                           200
Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Gly Gly Asn Asn Pro Ala
                       215
                                           220
Gln Met Asn Ala Arg Val Gly Tyr Tyr Arg Gln Tyr Cys Arg Gln Leu
                   230
                                       235
Gly Val Asp Pro Gly Pro Asn Leu Thr Cys
               245
<210> 55
<211> 753
<212> DNA
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1) ... (753)
<400> 55
tcg atg cag aac tgc ggc tgc cag cca aac gta tgc tgc agc aag ttt
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
 1
ggc tac tgc ggc aca acc gac gag tac tgc ggc gac ggg tgc cag tcg
                                                                 96
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
            20
144
Gly Pro Cys His Ser Gly Gly Gly Gly Gly Gly Gly Gly Ala
         35
aac gtg gct agc gtc gtc acc ggc tcc ttc ttc aac ggc atc aag aac
                                                                 192
```

Asn Val Ala Ser Val Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Asn

50 55 60

cag Gln 65	gcc Ala	gly aaa	agc Ser	gly aaa	tgc Cys 70	gag Glu	ggc Gly	aag Lys	aac Asn	ttc Phe 75	tac Tyr	acc Thr	cgg Arg	agc Ser	gcg Ala 80	240
				gtc Val 85												288
				aag Lys												336
				cat His												384
		_	_	ccg Pro		_		_		_	_	_				432
_				cgc Arg		_	_	_		_						480
				agg Arg 165	_							_	_			528
			_	gac Asp	_					_						576
	_			gtg Val		_		_	_	_				_		624
				aac Asn												672
_	_			cgc Arg					_	_		_	_	_		720
	_	_		999 Gly 245					_	tga *						753

<210> 56

<211> 250

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant sequence produced by shuffling techniques

<400> 56

Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe 1 5 10 15 Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser

```
Gly Pro Cys His Ser Gly Gly Gly Gly Gly Gly Gly Gly Gly Ala
                            40
Asn Val Ala Ser Val Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Asn
Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala
Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser
                                    90
Gln Val Gln Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Val Thr
                                105
His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn
                            120
                                                125
Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln
                        135
Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr
                    150
                                        155
Gly Pro Ala Gly Arg Asp Ile Gly Phe Asn Gly Leu Ala Asp Pro Asn
Arg Val Ala Gln Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe
                                185
Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr
                            200
Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Gly Gly Asn Asn Pro Ala
                        215
Gln Met Asn Ala Arg Ile Gly Tyr Tyr Lys Gln Tyr Cys Arg Gln Leu
                    230
                                        235
Gly Val Asp Pro Gly Pro Asn Leu Thr Cys
                245
<210> 57
<211> 753
<212> DNA
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1)...(753)
<400> 57
tcg atg cag aat tgc ggc tgc cag cca aac gta tgc tgc agc aag ttc
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
 1
gge tae tge gge aeg aee gae gag tae tge gge gee ggg tge eag teg
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Ala Gly Cys Gln Ser
             20
gge eeg tge ege teg gge gge gge age agt gge gge ggt ggt geg
                                                                   144
Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala
aac gtg gct agc gtc gtc acc ggc tcc ttc ttc aac ggc atc aag aac
                                                                   192
Asn Val Ala Ser Val Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Asn
     50
                         55
cag gcc ggg agc ggg tgc gag ggc aag aac ttc tac acc cgg agc gcg
                                                                   240
Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala
 65
```

```
ttc ctg agc gcc gtc aac gcg tac ccg ggc ttc gcc cat ggc ggg acg
                                                                   288
Phe Leu Ser Ala Val Asn Ala Tyr Pro Gly Phe Ala His Gly Gly Thr
                 85
                                     90
gag gtg gag cgc aag cgc gag att gcc gcc ttc ttc gcg cac gcc acg
Glu Val Glu Arg Lys Arg Glu Ile Ala Ala Phe Phe Ala His Ala Thr
            100
cac gag acc ggg cat ttc tgc tac atc agc gag atc aac aag agc aac
                                                                   384
His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn
        115
gcc tac tgc gac ccg acc aag agg cag tgg ccg tgc gcc gcg ggg cag
                                                                   432
Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln
    130
                        135
aag tac tac ggg cgc ggc ccg ctg cag atc tcg tgg aac tac aac tac
                                                                   480
Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr
145
                    150
ggg cee geg ggg ggg gee ate gge tte gae ggg ete ggg gae eee gge
                                                                   528
Gly Pro Ala Gly Gly Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro Gly
agg gtg gcg cgg gac gcc gtg gtg gcg ttc aag gcg gcg ctc tgg ttc
                                                                   576
Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe
tgg atg aac aac gtg cac cgt gtg atg ccg cag ggc ttc ggc gcc acc
                                                                   624
Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr
        195
                            200
atc egg gec atc aac gge gec etc gag tge gac gge aag aac eec aac
                                                                   672
Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asp Gly Lys Asn Pro Asn
    210
                        215
tcc gtc aac aac cgc gtc gcc tac tac agg cag tac tgc cgc cag ctc
                                                                   720
Ser Val Asn Asn Arg Val Ala Tyr Tyr Arg Gln Tyr Cys Arg Gln Leu
                    230
                                        235
ggc gtc gac cca ggg ccc aac ctc act tgc tga
                                                                   753
Gly Val Asp Pro Gly Pro Asn Leu Thr Cys
                245
<210> 58
<211> 250
<212> PRT
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Ala Gly Cys Gln Ser
                                25
Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala
                            40
Asn Val Ala Ser Val Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Asn
                        55
Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala
```

```
70
Phe Leu Ser Ala Val Asn Ala Tyr Pro Gly Phe Ala His Gly Gly Thr
Glu Val Glu Arg Lys Arg Glu Ile Ala Ala Phe Phe Ala His Ala Thr
                              105
His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn
                          120
Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln
                      135
                                          140
Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr
145
                   150
                                      155
Gly Pro Ala Gly Gly Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro Gly
               165
                                  170
Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe
                              185
Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr
Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asp Gly Lys Asn Pro Asn
                      215
Ser Val Asn Asn Arg Val Ala Tyr Tyr Arg Gln Tyr Cys Arg Gln Leu
                                      235
Gly Val Asp Pro Gly Pro Asn Leu Thr Cys
               245
<210> 59
<211> 771
<212> DNA
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1)...(771)
<400> 59
teg atg cag aac tge gge tge cag eea aac tte tge tge age aag ttt
                                                               48
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Phe Cys Cys Ser Lys Phe
                                   10
ggc tac tgc ggc acg acc gac gcc tac tgc ggc gac ggg tgc cag tcg
                                                               96
Gly Tyr Cys Gly Thr Thr Asp Ala Tyr Cys Gly Asp Gly Cys Gln Ser
            20
144
35
gga ggc agt ggc ggt gcg aac gtg gct aat gtg gtc acc gac gcg ttc
                                                               192
Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala Phe
     50
ttc aac ggc atc aag aac cag gcc ggg agc ggg tgc gag ggc aag aac
                                                               240
Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn
 65
                    70
ttc tac acc cgg agc gcg ttc ctg agc gcc gtc aag gcg tac cca ggc
                                                               288
Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly
                85
ttc gcc cat ggc ggg tca cag gtg cag ggc aag cgc gag att gcc gcc
                                                               336
Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala Ala
```

100	105	110

	ttc Phe															384
	atc Ile 130		_	_		_		_	_	_		_		_		432
_	tgc Cys	_			_	_				_		_	_			480
	tgg Trp										-				_	528
	ctc Leu		_					_	Arg	_	_					576
_	gcg Ala						_					_		_	_	624
	ggc Gly 210															672
_	Gly				_	_	_			_	_					720
_	tac Tyr	_	_	_			_	_							_	768
tga *	L															771

<210> 60

<211> 256

<212> PRT

<213> Artificial Sequence

<223> Variant sequence produced by shuffling techniques

<400> 60

Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Phe Cys Cys Ser Lys Phe 10 Gly Tyr Cys Gly Thr Thr Asp Ala Tyr Cys Gly Asp Gly Cys Gln Ser 25

40 45

Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala Phe 55 Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn

70 75 Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly

```
Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala Ala
Phe Phe Ala His Val Thr His Glu Thr Gly His Phe Cys Tyr Ile Ser
Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp
                      135
Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile
                   150
                                      155
Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp
               165
                                  170
Gly Leu Gly Asp Pro Gly Arg Val Ala Arg Asp Ala Val Val Ala Phe
                              185
Lys Ala Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met Pro
                          200
Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys
                      215
Asp Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr Arg
                   230
                                      235
Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr Cys
<210> 61
<211> 771
<212> DNA
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1)...(771)
<400> 61
tcg atg cag aac tgc ggc tgc cag cca aac gta tgc tgc agc aag ttc
                                                              48
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
                                   10
                                                      15
gge tae tge gge aeg aee gae gag tae tge gge gae ggg tge eag teg
                                                              96
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
            20
                                                  30
144
35
gga ggc agt ggc ggt gcg aac gtg gct agc gtc acc ggc tcc ttc
                                                              192
Gly Gly Ser Gly Gly Ala Asn Val Ala Ser Val Val Thr Gly Ser Phe
     50
ttc aac ggc atc aag agc cag gcc ggg agc ggg tgc gag ggc aag aac
Phe Asn Gly Ile Lys Ser Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn
 65
ttc tac acc cgg agc gcg ttc ctg agc gcc gtc aag gcg tac cca ggc
                                                              288
Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly
tte gee cat gge gge tee gag gte gag ege aag ege gag att gee gee
                                                              336
Phe Ala His Gly Gly Ser Glu Val Glu Arg Lys Arg Glu Ile Ala Ala
```

				gcc Ala												384
			_	agc Ser		_		-	_	_		_		_		432
_		_		Gly 393	_	_				_		_	_	_		480
_				aac Asn 165							_				_	528
				ccc Pro												576
_				tgg Trp			_					_		_	_	624
_				gcc Ala				_							_	672
				ccc Pro												720
_		_	_	cag Gln 245			_	_							_	768
tga *																771
<21:	0> 62 1> 2! 2> PI 3> A	56 RT	icia	l Sed	quenc	ce										
<22 <22		aria	nt se	equei	nce p	produ	ıced	by :	shuf	fling	g te	chnic	ques			
Ser	0> 62 Met		Asn	Cys	Gly	Cys	Gln	Pro		Val	Cys	Cys	Ser	_	Phe	
1 Gly	Tyr	Cys	Gly 20	Thr	Thr	Asp	Glu	Tyr 25	10 Cys	Gly	Asp	Gly	Cys 30	15 Gln	Ser	
Gly	Pro	Cys 35		Pro	Gly	Gly	Gly 40		Gly	Gly	Gly	Gly 45		Gly	Gly	
_	50		_	Gly		55					60		-			
65				Lys	70					75					80	
				Ser 85					90		_		_	95	_	
Phe	Ala	His	GIA	Gly	ser	Glu	Val	Glu	Arg	Lys	Arg	GLu	He	Ala	Ala	

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Phe Phe Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile Asn
Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp
                      135
Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile
                                      155
                   150
Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp
               165
                                  170
Gly Leu Ala Asp Pro Gly Arg Val Ala Arg Asp Ala Val Val Ala Phe
                              185
Lys Ala Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met Pro
                          200
                                             205
Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys
                      215
Asp Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr Lys
                   230
                                      235
Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr Cys
<210> 63
<211> 774
<212> DNA
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1)...(774)
<400> 63
teg atg cag aac tge gge tge cag eca aac tte tge tge age aag tte
                                                               48
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Phe Cys Cys Ser Lys Phe
                                   10
ggc tac tgc ggc aca acc gac gag tac tgc ggc gac ggg tgc cag tcg
                                                               96
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
            20
                                                  30
144
35
ggc gga ggc agt ggc ggt gcg aac gtg gct aat gtg gtc acc gac gcg
                                                               192
Gly Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala
    50
                       55
ttc ttc aac ggc atc aag aac cag gcc ggg agc ggg tgc gag ggc aag
                                                               240
Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys
 65
                    70
aac ttc tac acc cgg agc gcg ttc ctg agc gcc gtc aag gcg tac cca
Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro
ggc ttc gcc cat ggc ggg tca cag gtg cag ggc aag cgc gag atc gcc
                                                               336
Gly Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala
           100
                              105
gcc ttc ttc gcg cac gcc acg cac gag acc ggg cat ttc tgc tac atc
                                                               384
Ala Phe Phe Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile
```

115 120 125

_	_			_	_		_		_	_	_		_	agg Arg	_	432
	_	_	_			_	_				_		_	ctg Leu	_	480
_	_								_			_		ggc Gly 175		528
			_	_							_			ctg Leu		576
	_							_					_	gtg Val	_	624
_	_				_				_				_	ctc Leu	_	672
_						_	_	_	_		_	_		tac Tyr		720
_	_		_	_	_			_	_					ctc Leu 255		768
tgc Cys	tga *															774

<210> 64

<211> 257

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant sequence produced by shuffling techniques

<400> 64

Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Phe Cys Cys Ser Lys Phe

1 5 10 15

Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser

20 25 30

Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala 50 55 60

Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys 65 70 75 80
Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro

85 90 95
Gly Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala

```
Ala Phe Phe Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile
Ser Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln
                       135
                                          140
Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln
                                      155
                   150
Leu Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Asp Ile Gly Phe
               165
                                  170
                                                     175
Asn Gly Leu Ala Asp Pro Asn Arg Val Ala Arg Asp Pro Val Leu Ala
                              185
                                                 190
Phe Lys Ala Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met
                          200
Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Lys
                       215
Cys Gly Gly Asn Asn Pro Ala Gln Met Asp Ala Arq Val Gly Tyr Tyr
                   230
                                      235
Lys Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr
Cys
<210> 65
<211> 774
<212> DNA
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1)...(774)
<400> 65
tcg atg cag aac tgc ggc tgc cag cca aac gta tgc tgc agc aag ttt
                                                               48
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
                                   10
gge tac tge gge acg ace gac gag tac tge gge gac ggg tge cag teg
                                                               96
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
            20
144
35
                           40
ggc gga ggc agt ggt ggt gcg aac gtg gct agc gtc gtc acc gac tcc
                                                               192
Gly Gly Gly Ser Gly Gly Ala Asn Val Ala Ser Val Val Thr Asp Ser
     50
ttc ttc aac ggc atc aag aac cag gcc ggg agc ggg tgc gag ggc aag
                                                               240
Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys
 65
aac tte tae ace egg age geg tte etg age gee gte aag geg tae eea
                                                               288
Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro
                                                      95
ggc ttc gcc cat ggc ggg tcg cag gtg cag ggc aag cgc gag atc gcc
                                                               336
Gly Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala
```

```
gcc ttc ttc gcg cat gtc acg cac gag acc ggg cat ttc tgc tac atc
                                                                 384
Ala Phe Phe Ala His Val Thr His Glu Thr Gly His Phe Cys Tyr Ile
                           120
age gag ate aac aag age aac gee tae tge gae eeg ace aag agq caq
                                                                 432
Ser Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln
                       135
tgg ccg tgc gcc gcg ggg cag aag tac tac ggg cgt ggc ccg ctg cag
                                                                 480
Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln
                   150
                                       155
atc tcg tgg aac tac aac tac ggg ccc gcg ggg agg gcc atc ggc ttc
                                                                 528
Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe
               165
                                   170
gac ggg ctc gcc gac ccc aac agg gtg gcg cag gac gcc gtg gtg gcg
                                                                 576
Asp Gly Leu Ala Asp Pro Asn Arg Val Ala Gln Asp Ala Val Val Ala
           180
                               185
ttc aag gcg gcg ctc tgg ttc tgg atg aac aac gtg cac cgt gtg atg
                                                                 624
Phe Lys Ala Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met
       195
                           200
ccg cag ggc ttc ggc gcc acc atc agg gcc atc aac ggc gcc ctc gag
                                                                 672
Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu
    210
                       215
tge gge ggg aac aac ccc gcc cag atg aac gcg cgc gtc ggc tac tac
                                                                 720
Cys Gly Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr
225
                   230
aag cag tac tgc cgc cag ctc ggc gtc gac cca ggg ccc aac ctc act
Lys Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr
               245
tgc tga
                                                                 774
Cys *
<210> 66
<211> 257
<212> PRT
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
<400> 66
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
                                   10
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
                               25
40
Gly Gly Ser Gly Gly Ala Asn Val Ala Ser Val Val Thr Asp Ser
                       55
                                           60
Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys
                                       75
```

Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro 85 Gly Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala 105 Ala Phe Phe Ala His Val Thr His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln 135 Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln 150 155 Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe 165 170 175 Asp Gly Leu Ala Asp Pro Asn Arg Val Ala Gln Asp Ala Val Val Ala 185 190 Phe Lys Ala Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met 200 Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu 215 220 Cys Gly Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr 230 235 Lys Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr 250 Cys

48

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His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala Ala Phe Phe
           100
                               105
geg cac gec acg cac gag acc ggg cat ttc tgc tac atc agc gag atc
                                                                 384
Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile
                           120
aac aag agc aac gcc tac tgc gac ccg acc aag agg cag tgg ccg tgc
                                                                 432
Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys
   130
                       135
                                                                 480
gcc gcg ggg cag aag tac tac ggg cgc ggc ccg ctg cag atc tcg tgg
Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp
                   150
                                       155
aac tac aac tac ggg ccc gcg ggg agg gcc atc ggc ttc gac ggg ctc
                                                                 528
Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu
               165
                                   170
ggq gac ccc aac agg gtg gcg cag gac gcc gtg gtg gcg ttc aag gcg
                                                                 576
Gly Asp Pro Asn Arg Val Ala Gln Asp Ala Val Val Ala Phe Lys Ala
                               185
gcg ctc tgg ttc tgg atg aac aac gtg cac cgt gtg atg ccg cag ggc
                                                                 624
Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly
        195
                           200
ttc ggc gcc acc atc agg gcc atc aac ggc gcg ctc gag tgc gac ggg
                                                                 672
Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asp Gly
    210
                       215
aac aac ccc gcc cag atg aac gcg cgc gtc ggc tac tac aag cag tac
                                                                 720
Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr Lys Gln Tyr
225
                                       235
                   230
tge ege cag ete gge gte gae eca ggg eee aac ete aet tge tga
                                                                 765
Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr Cys
                245
<210> 68
<211> 254
<212> PRT
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
40
Ser Gly Gly Ala Asn Val Ala Ser Val Val Thr Gly Ser Phe Phe Asn
Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr
                                       75
Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala
                                   90
His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala Ala Phe Phe
```

105 100 Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys 135 Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu 165 170 Gly Asp Pro Asn Arg Val Ala Gln Asp Ala Val Val Ala Phe Lys Ala 185 Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly 200 Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asp Gly 215 Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr Lys Gln Tyr 225 230 235 Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr Cys <210> 69 <211> 753 <212> DNA <213> Artificial Sequence <220> <223> Variant sequence produced by shuffling techniques <221> CDS <222> (1) ... (753) <400> 69 tcg atg cag aac tgc ggc tgc cag cca aac gta tgc tgc agc aag ttc 48 Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe 10 ggc tac tgc ggc aca acc gac gag tac tgc ggc gac ggg tgc cag tcg 96 Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser 20 gge eeg tge ege teg gge gge gge age agt gge gge ggt ggt geg 144 Gly Pro Cys Arg Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala 35 aac gtg gct agc gtc gtc acc ggc tcc ttc ttc aac ggc atc aag aac 192 Asn Val Ala Ser Val Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Asn 50 55 cag gcc ggg agc ggg tgc gag ggc aag aac ttc tac acc cgg agc gcg 240 Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala 65 70 ttc ctg agc gcc gtc aag gcg tac cca ggc ttc gcc cat ggc ggg tca 288 Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser cag gtg cag ggc aag cgc gag atc gcc gcc ttc ttc gcg cac gcc acg Gln Val Gln Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Ala Thr 100 cac gag acc ggg cat ttc tgt tac atc agc gag atc agc aag agc aac His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Ser Lys Ser Asn

115 120 125

_	tac Tyr 130	_	_	_		_		_		_	_	_			_	432
_	tac Tyr			_		_	_	_		_						480
	ccc Pro	_			_				_				_			528
	gtg Val			_	_					_						576
	atg Met					_		_	_	_				_		624
	agg Arg 210	_							_	_					_	672
_	atg Met			_					_	_		_	_	_		720
	gtc Val	_							_	tga *						753

<210> 70

<211> 250

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant sequence produced by shuffling techniques

<400> 70

 Ser
 Met
 Gln
 Asn
 Cys
 Gly
 Cys
 Gln
 Pro
 Asn
 Val
 Cys
 Cys
 Ser
 Lys
 Phe

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His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Ser Lys Ser Asn
115
120
125

Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln
130
135
140
Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr

155 Gly Pro Ala Gly Arg Asp Ile Gly Phe Asp Gly Leu Gly Asp Pro Gly 170 Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Asp Gly Asn Asn Pro Ala 215 220 Gln Met Asn Ala Arg Ile Gly Tyr Tyr Lys Gln Tyr Cys Arg Gln Leu 230 235 Gly Val Asp Pro Gly Pro Asn Leu Thr Cys 245 <210> 71 <211> 774 <212> DNA <213> Artificial Sequence <220> <223> Variant sequence produced by shuffling techniques <221> CDS <222> (1) ... (774) <400> 71 tcg atg cag aac tgc ggc tgc cag cca aac gta tgc tgc agc aag ttc 48 Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe 10 ggc tac tgc ggc acg acc gac gag tac tgc ggc gac ggg tgc cag tcg 96 Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser 20 30 144 35 40 ggc gga ggc agt ggc ggt gcg aac gtg gct aat gtg gtc acc gac gcg 192 Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Val Thr Asp Ala 50 55 60 ttc ttc aac ggc atc aag agc cag gcc ggg agc ggg tgc gag ggc aag 240 Phe Phe Asn Gly Ile Lys Ser Gln Ala Gly Ser Gly Cys Glu Gly Lys 65 70 75 aac ttc tac acc cgg agc gcg ttc ctg agc gcc gtc aag gcg tac cca Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro 85 ggc ttc gcc cat ggc ggg tca cag gtg cag ggc aag cgc gag atc gcc 336 Gly Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala gcc ttc ttc gcg cac gcc acg cac gag acc ggg cat ttc tgc tac atc 384 Ala Phe Phe Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile 115 age gag ate aac aag age aac gee tae tge gae eeg ace aag agg eag 432 Ser Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln 130

```
tgg ccg tgc gcc gcg ggg cag aag tac tac ggg cgc ggc ccg ctg cag
                                                                480
Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln
145
                   150
ate teg tgg aac tac aac tac ggg eec geg ggg agg gec ate ggc tte
                                                                528
Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe
gac ggg ctc ggg gac ccc ggc agg gtg gcg cgg gac gcc gtg gtg gcg
                                                                576
Asp Gly Leu Gly Asp Pro Gly Arg Val Ala Arg Asp Ala Val Val Ala
           180
ttc aag gcg gcg ctc tgg ttc tgg atg aac aac gtg cac cgt gtg atg
                                                                624
Phe Lys Ala Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met
       195
                           200
ccg cag ggc ttc ggc gcc acc atc agg gcc atc aac ggc gcg ctc gag
                                                                672
Pro Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu
   210
                       215
tgc gac ggg aac aac ccc gcc cag atg aac gcg cgc atc ggc tac tac
                                                                720
Cys Asp Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Ile Gly Tyr Tyr
225
aag cag tac tgc cgc cag ctc ggc gtc gac cca ggg ccc aac ctc act
                                                                768
Lys Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr
tgc tga
                                                                774
Cys *
<210> 72
<211> 257
<212> PRT
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
Gly Gly Ser Gly Gly Ala Asn Val Ala Asn Val Thr Asp Ala
                       55
Phe Phe Asn Gly Ile Lys Ser Gln Ala Gly Ser Gly Cys Glu Gly Lys
                                       75
Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro
Gly Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala
Ala Phe Phe Ala His Ala Thr His Glu Thr Gly His Phe Cys Tyr Ile
                           120
Ser Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln
                       135
                                           140
Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln
                                       155
Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe
```

					165					170					175		
As	p (Gly	Leu	Gly 180	Asp	Pro	Gly	Arg	Val 185	Ala	Arg	Asp	Ala	Val 190	Val	Ala	
Ph	e 1	ГÀг	Ala 195	Ala	Leu	Trp	Phe	Trp 200	Met	Asn	Asn	Val	His 205	Arg	Val	Met	
	:	210	_		_		215		Arg			220	_				
22	5					230			Met		235	_		_	-	240	
Ьу	rs (Gln	Tyr	Cys	Arg 245	Gln	Leu	Gly	Val	Asp 250	Pro	Gly	Pro	Asn	Leu 255	Thr	
Су	s																
<2 <2	11:	> 73 > 77 > DN > Ar	'1 IA	cial	Sec	quenc	:e										
	20		riar	nt se	equer	nce p	rodu	ıced	by s	shufi	ling	g ted	hnic	ques			
< 2	22		_)	. (771	L)												
to	g er l		cag						cca Pro								48
									tac Tyr 25								96
									ggc Gly								144
			_						gct Ala	_	_	_		_			192
Pł									gly aaa								240
									agc Ser								288
									cag Gln 105								336
									acc Thr								384
_	Lu			_	_		_		tgc Cys	_	_		_		_		432

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ccg tgc gcc gcg ggg caq agq tac tac ggg cgt ggc ccq ctq caq atc
                                                                480
Pro Cys Ala Ala Gly Gln Arg Tyr Tyr Gly Arg Gly Pro Leu Gln Ile
teg tgg aac tac aac tac ggg eec geg ggg agg gec atc gge tte gac
                                                                528
Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp
ggg ctc ggg gac ccc ggc agg gtg gcg cgg gac gcc gtg gtg gcg ttc
                                                                576
Gly Leu Gly Asp Pro Gly Arg Val Ala Arg Asp Ala Val Val Ala Phe
           180
aag gcg gcg ctc tgg ttc tgg atg aac aac gtg cac cgt gtg atg ccg
                                                                624
Lys Ala Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met Pro
       195
cag ggc ttc ggc gcc acc atc agg gcc atc aac ggc gcc ctc qag tqc
                                                                672
Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys
   210
                       215
gac ggg aac aac ccc gcc caq atq aac gcg cgc atc ggc tac tac aaq
                                                                720
Asp Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Ile Gly Tyr Tyr Lys
cag tac tgc cgc cag ctc ggc gtc gac cca ggg ccc aac ctc act tgc
                                                                768
Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr Cys
               245
tga
                                                                771
<210> 74
<211> 256
<212> PRT
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
Gly Gly Ser Gly Gly Ala Asn Val Ala Ser Val Val Thr Asp Ser Phe
Phe Asn Gly Ile Lys Ser Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn
                   70
                                       75
Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly
Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala Ala
                               105
Phe Phe Ala His Val Thr His Glu Thr Gly His Phe Cys Tyr Ile Asn
                           120
```

140

Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp

Pro Cys Ala Ala Gly Gln Arg Tyr Tyr Gly Arg Gly Pro Leu Gln Ile

Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp

	165	170	175
Gly Leu Gly Asp 180	Pro Gly Arg Val	l Ala Arg Asp Ala Val 185	Val Ala Phe 190
Lys Ala Ala Leu 195	Trp Phe Trp Met 200	t Asn Asn Val His Arg of 205	Val Met Pro
Gln Gly Phe Gly 210	Ala Thr Ile Arg	g Ala Ile Asn Gly Ala 220	Leu Glu Cys
Asp Gly Asn Asn 225	Pro Ala Gln Me	t Asn Ala Arg Ile Gly 235	Tyr Tyr Lys 240
		l Asp Pro Gly Pro Asn 250	
	2.15	230	233
<210> 75 <211> 780			
<212> DNA	3. 0		
<213> Artificia	1 sequence		
<220> <223> Variant s	equence produce	d by shuffling techniq	ues
<221> CDS	-)		
<222> (1) (78	0)		
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Ser Met Gln Asn	Cys Gly Cys Gl	n Pro Asn Val Cys Cys 10	Ser Lys Phe 15
ggc tac tgc ggc	aca acc qac qa	g tac tgc ggc gac ggg	tgc cag tcg 96
	Thr Thr Asp Gl	u Tyr Cys Gly Asp Gly	
		t ggc ggc ggc ggc ggc	
	Pro Gly Gly Gl	y Gly Gly Gly Gly Gly 0 45	
			ata ata aga 100
Gly Gly Gly Ser	Gly Gly Gly Gl	t gtg aac gtg gcc agc y Val Asn Val Ala Ser	
50	55	60	210
Gly Ser Phe Phe	Asn Gly Ile Ly	g aac cag gcc ggg agc s Asn Gln Ala Gly Ser	Gly Cys Glu
65	70	75	80
		c gcg ttc ctg agc gcc r Ala Phe Leu Ser Ala	
	85	90	95
		g tca cag gtg cag ggc y Ser Gln Val Gln Gly	
100		105	110
		c acg cat gag acc ggg	
115	12	_	<u>-1</u> -
		c aac gcc tac tgc gac r Asn Ala Tyr Cys Asp	
130	135	140	IIO IIII IIys
		g cag aag tac tac ggg	
Arg Gin Trp Pro	Cys Ala Ala Gl	y Gln Lys Tyr Tyr Gly	AIG GIY Pro

150 155 145 160 ctg cag atc tcg tgg aac tac aac tac ggg ccc gcg ggg agg gcc atc 528 Leu Gln Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile ggc ttc gac ggg ctc ggg gac ccc aac agg gtg gcg cgg gac ccc gtg 576 Gly Phe Asp Gly Leu Gly Asp Pro Asn Arg Val Ala Arg Asp Pro Val 180 ctg gcg ttc aag gcg gcg ctc tgg ttc tgg atg aac agc gtg cac ggg 624 Leu Ala Phe Lys Ala Ala Leu Trp Phe Trp Met Asn Ser Val His Gly 195 gtg gtg ccg cag ggg ttc ggc gcc acc acc agg gcc atc aac ggc gcc 672 Val Val Pro Gln Gly Phe Gly Ala Thr Thr Arg Ala Ile Asn Gly Ala 215 ctc qaq tqc aac qqq aac aac ccc qcc caq atq aac qcq cqc qtc qqc Leu Glu Cys Asn Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly tac tac agg cag tac tgc cgc cag ctc ggc gtc gac cca ggg ccc aac 768 Tyr Tyr Arg Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn 245 250 ctc act tgc tga 780 Leu Thr Cys * <210> 76 <211> 259 <212> PRT <213> Artificial Sequence <223> Variant sequence produced by shuffling techniques Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser Gly Gly Ser Gly Gly Gly Val Asn Val Ala Ser Ile Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Asn Gln Ala Gly Ser Gly Cys Glu 75 Gly Lys Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala 90 Tyr Pro Gly Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu 105 Ile Ala Ala Phe Phe Ala His Val Thr His Glu Thr Gly His Phe Cys 120 Tyr Ile Ser Glu Ile Ser Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys 135 140 Arg Gln Trp Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro

170

Leu Gln Ile Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile

Gly Phe Asp Gly Leu Gly Asp Pro Asn Arg Val Ala Arg Asp Pro Val

155

150

Leu Ala Phe Lys Ala Ala Leu Trp Phe Trp Met Asn Ser Val His Gly 200 Val Val Pro Gln Gly Phe Gly Ala Thr Thr Arg Ala Ile Asn Gly Ala 215 Leu Glu Cys Asn Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly 230 235 Tyr Tyr Arg Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn 250 Leu Thr Cys <210> 77 <211> 753 <212> DNA <213> Artificial Sequence <220> <223> Variant sequence produced by shuffling techniques <221> CDS <222> (1) ... (753) <400> 77 tcg atg cag aac tgc ggc tgc cag cca aac gta tgc tgc agc aag ttc 48 Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe 10 ggc tac tgc ggc acg acc gac gag tac tgc ggc gac ggg tgc cag tcg 96 Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser 20 25 ggc ccg tgc cac tcg ggc ggc ggc agc agt ggc ggc ggt ggt gtg 144 Gly Pro Cys His Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Val 35 40 aac gtg gcc agc atc gtg acc ggc tcc ttc ttc aac ggc atc aag aac 192 Asn Val Ala Ser Ile Val Thr Gly Ser Phe Phe Asn Gly Ile Lys Asn 50 55 cag gcc ggg agc ggg tgc gag ggc aag aac ttc tac acc cgg agc gcg 240 Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala 65 70 75 tto ctg age gee gte aag geg tac eea gge tte gee eat gge ggg aeg 288 Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Thr 85 gag gtg gag ggc aag cgc gag att gcc gcc ttc ttc gcg cac gcc acg 336 Glu Val Glu Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Ala Thr 100 cac gag acc ggg cat ttc tgc tac atc agc gag atc agc aag agc aac 384 His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Ser Lys Ser Asn 115 gcc tac tgc gac ccg acc aag agg cag tgg ccg tgc gcc gcg ggg cag 432 Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln 130 aag tac tac gga cgc ggc ccg ctg cag atc tcg tgg aac tac aac tac 480 Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr

145	150	155	160
		ttc gac ggg ctc ggg g Phe Asp Gly Leu Gly A 170	
		gcg ttc aag gcg gcg c Ala Phe Lys Ala Ala I 185 1	
		atg ccg cag ggc ttc g Met Pro Gln Gly Phe G 205	
		gag tgc ggc ggg aac a Glu Cys Gly Gly Asn A 220	
		tac aag cag tac tgc c Tyr Lys Gln Tyr Cys A 235	
ggc gtc gac cca ggg Gly Val Asp Pro Gly 245			753
<210> 78 <211> 250 <212> PRT			
<213> Artificial Se <220> <223> Variant seque		by shuffling techniqu	les
<220> <223> Variant seque <400> 78	nce produced		
<220> <223> Variant seque <400> 78 Ser Met Gln Asn Cys 1 5	nce produced Gly Cys Gln	Pro Asn Val Cys Cys S	er Lys Phe 15
<220> <223> Variant seque <400> 78 Ser Met Gln Asn Cys 1 5 Gly Tyr Cys Gly Thr 20	nce produced Gly Cys Gln Thr Asp Glu	Pro Asn Val Cys Cys S 10 Tyr Cys Gly Asp Gly C	er Lys Phe 15 'ys Gln Ser 0
<220> <223> Variant seque <400> 78 Ser Met Gln Asn Cys 1 5 Gly Tyr Cys Gly Thr 20	nce produced Gly Cys Gln Thr Asp Glu	Pro Asn Val Cys Cys S 10 Tyr Cys Gly Asp Gly C	er Lys Phe 15 'ys Gln Ser 0
<220> <223> Variant seque <400> 78 Ser Met Gln Asn Cys 1 5 Gly Tyr Cys Gly Thr 20 Gly Pro Cys His Ser 35	nce produced Gly Cys Gln Thr Asp Glu Gly Gly Gly 40	Pro Asn Val Cys Cys S 10 Tyr Cys Gly Asp Gly C 25 Gly Ser Ser Gly Gly G	er Lys Phe 15 Sys Gln Ser 0 Gly Gly Val
<220> <223> Variant seque <400> 78 Ser Met Gln Asn Cys 1 5 Gly Tyr Cys Gly Thr 20 Gly Pro Cys His Ser 35 Asn Val Ala Ser Ile	nce produced Gly Cys Gln Thr Asp Glu Gly Gly Gly 40 Val Thr Gly 55	Pro Asn Val Cys Cys S 10 Tyr Cys Gly Asp Gly C 25 Gly Ser Ser Gly Gly G 45 Ser Phe Phe Asn Gly I	er Lys Phe 15 Cys Gln Ser 0 Cly Gly Val
<220> <223> Variant seque <400> 78 Ser Met Gln Asn Cys 1 5 Gly Tyr Cys Gly Thr 20 Gly Pro Cys His Ser 35 Asn Val Ala Ser Ile 50 Gln Ala Gly Ser Gly 65 Phe Leu Ser Ala Val	Gly Cys Gln Thr Asp Glu Gly Gly Gly 40 Val Thr Gly 55 Cys Glu Gly 70	Pro Asn Val Cys Cys S 10 Tyr Cys Gly Asp Gly C 25 Gly Ser Ser Gly Gly G 45 Ser Phe Phe Asn Gly I 60 Lys Asn Phe Tyr Thr A 75 Pro Gly Phe Ala His C	Ser Lys Phe 15 Sys Gln Ser 0 Sly Gly Val Sle Lys Asn arg Ser Ala 80 Sly Gly Thr
<220> <223> Variant seque <400> 78 Ser Met Gln Asn Cys 1	Gly Cys Gln Thr Asp Glu Gly Gly Gly 40 Val Thr Gly 55 Cys Glu Gly 70 Lys Ala Tyr	Pro Asn Val Cys Cys S 10 Tyr Cys Gly Asp Gly C 25 Gly Ser Ser Gly Gly G 45 Ser Phe Phe Asn Gly G 60 Lys Asn Phe Tyr Thr A 75 Pro Gly Phe Ala His G 90 Ala Ala Phe Phe Ala F	Ser Lys Phe 15 Sys Gln Ser 0 Sly Gly Val Sle Lys Asn Arg Ser Ala 80 Sly Gly Thr 95 Sis Ala Thr
<220> <223> Variant seque <400> 78 Ser Met Gln Asn Cys 1	nce produced Gly Cys Gln Thr Asp Glu Gly Gly Gly 40 Val Thr Gly 55 Cys Glu Gly 70 Lys Ala Tyr Arg Glu Ile Phe Cys Tyr	Pro Asn Val Cys Cys S 10 Tyr Cys Gly Asp Gly C 25 Gly Ser Ser Gly Gly G 45 Ser Phe Phe Asn Gly G 60 Lys Asn Phe Tyr Thr A 75 Pro Gly Phe Ala His G 90 Ala Ala Phe Phe Ala H 105 Ile Ser Glu Ile Ser I	Ser Lys Phe 15 Sys Gln Ser 0 Sly Gly Val Sle Lys Asn Arg Ser Ala 80 Sly Gly Thr 95 Sis Ala Thr
<pre><220> <223> Variant seque <400> 78 Ser Met Gln Asn Cys 1</pre>	nce produced Gly Cys Gln Thr Asp Glu Gly Gly Gly 40 Val Thr Gly 55 Cys Glu Gly 70 Lys Ala Tyr Arg Glu Ile Phe Cys Tyr 120 Thr Lys Arg	Pro Asn Val Cys Cys S 10 Tyr Cys Gly Asp Gly C 25 Gly Ser Ser Gly Gly G 45 Ser Phe Phe Asn Gly I 60 Lys Asn Phe Tyr Thr A 75 Pro Gly Phe Ala His G 90 Ala Ala Phe Phe Ala H 105 Ile Ser Glu Ile Ser I 125 Gln Trp Pro Cys Ala A	Ser Lys Phe 15 Sys Gln Ser 0 Sly Gly Val Sle Lys Asn Arg Ser Ala 80 Sly Gly Thr 95 Sis Ala Thr
<pre><220> <223> Variant seque <400> 78 Ser Met Gln Asn Cys 1</pre>	nce produced Gly Cys Gln Thr Asp Glu Gly Gly Gly 40 Val Thr Gly 55 Cys Glu Gly 70 Lys Ala Tyr Arg Glu Ile Phe Cys Tyr 120 Thr Lys Arg 135 Gly Pro Leu	Pro Asn Val Cys Cys S 10 Tyr Cys Gly Asp Gly C 25 Gly Ser Ser Gly Gly G 45 Ser Phe Phe Asn Gly I 60 Lys Asn Phe Tyr Thr A 75 Pro Gly Phe Ala His G 90 Ala Ala Phe Phe Ala H 105 Ile Ser Glu Ile Ser I 125 Gln Trp Pro Cys Ala A 140 Gln Ile Ser Trp Asn I	Ser Lys Phe 15 Cys Gln Ser 0 Cly Gly Val Cle Lys Asn Arg Ser Ala 80 Cly Gly Thr 95 Clis Ala Thr 10 Cys Ser Asn Cla Gly Gln Cyr Asn Tyr
<pre><220> <223> Variant seque <400> 78 Ser Met Gln Asn Cys 1</pre>	nce produced Gly Cys Gln Thr Asp Glu Gly Gly Gly 40 Val Thr Gly 55 Cys Glu Gly 70 Lys Ala Tyr Arg Glu Ile Phe Cys Tyr 120 Thr Lys Arg 135 Gly Pro Leu 150 Ala Ile Gly	Pro Asn Val Cys Cys S 10 Tyr Cys Gly Asp Gly C 25 Gly Ser Ser Gly Gly G 45 Ser Phe Phe Asn Gly I 60 Lys Asn Phe Tyr Thr A 75 Pro Gly Phe Ala His G 90 Ala Ala Phe Phe Ala H 105 Ile Ser Glu Ile Ser I 125 Gln Trp Pro Cys Ala A 140 Gln Ile Ser Trp Asn I 155 Phe Asp Gly Leu Gly A	Ser Lys Phe 15 Cys Gln Ser 0 Cly Gly Val Cle Lys Asn Arg Ser Ala 80 Cly Gly Thr 95 Clis Ala Thr 10 Cys Ser Asn Ala Gly Gln Cyr Asn Tyr 160 Asp Pro Asn
<220> <223> Variant seque <400> 78 Ser Met Gln Asn Cys 1	nce produced Gly Cys Gln Thr Asp Glu Gly Gly Gly 40 Val Thr Gly 55 Cys Glu Gly 70 Lys Ala Tyr Arg Glu Ile Phe Cys Tyr 120 Thr Lys Arg 135 Gly Pro Leu 150 Ala Ile Gly	Pro Asn Val Cys Cys S 10 Tyr Cys Gly Asp Gly C 25 Gly Ser Ser Gly Gly G 45 Ser Phe Phe Asn Gly I 60 Lys Asn Phe Tyr Thr A 75 Pro Gly Phe Ala His G 90 Ala Ala Phe Phe Ala H 105 Ile Ser Glu Ile Ser I 125 Gln Trp Pro Cys Ala A 140 Gln Ile Ser Trp Asn I 155 Phe Asp Gly Leu Gly A 170 Ala Phe Lys Ala Ala I	Ser Lys Phe 15 Sys Gln Ser 0 Sly Gly Val Sle Lys Asn Arg Ser Ala 80 Sly Gly Thr 95 Sis Ala Thr 10 Sys Ser Asn Ala Gly Gln Cyr Asn Tyr 160 Asp Pro Asn 175 Seu Trp Phe
<220> <223> Variant seque <400> 78 Ser Met Gln Asn Cys 1	nce produced Gly Cys Gln Thr Asp Glu Gly Gly Gly 40 Val Thr Gly 55 Cys Glu Gly 70 Lys Ala Tyr Arg Glu Ile Phe Cys Tyr 120 Thr Lys Arg 135 Gly Pro Leu 150 Ala Ile Gly Ala Val Val	Pro Asn Val Cys Cys S 10 Tyr Cys Gly Asp Gly C 25 Gly Ser Ser Gly Gly G 45 Ser Phe Phe Asn Gly I 60 Lys Asn Phe Tyr Thr A 75 Pro Gly Phe Ala His G 90 Ala Ala Phe Phe Ala H 105 Ile Ser Glu Ile Ser I 125 Gln Trp Pro Cys Ala A 140 Gln Ile Ser Trp Asn I 155 Phe Asp Gly Leu Gly A 170 Ala Phe Lys Ala Ala I	Ser Lys Phe 15 Sys Gln Ser 0 Sly Gly Val Sle Lys Asn Arg Ser Ala 80 Sly Gly Thr 95 Sis Ala Thr 10 Sys Ser Asn Ala Gly Gln Cyr Asn Tyr 160 Asp Pro Asn 175 Seu Trp Phe

225 Gly Val Asp Pro C	230	220 r Tyr Lys Gln Tyr 235 u Thr Cys 250	Cys Arg Gln Leu 240
<210> 79 <211> 750 <212> DNA <213> Artificial	Sequence		
<220> <223> Variant sec	quence produce	d by shuffling te	chniques
<221> CDS <222> (1) (750))		
		g cca aac gta tgc n Pro Asn Val Cys 10	
		g tac tgc ggc gcc u Tyr Cys Gly Ala 25	
		c ggc agc ggc ggc y Gly Ser Gly Gly 0	
		c ttc ttc aac ggc r Phe Phe Asn Gly 60	
		g aac ttc tac acc s Asn Phe Tyr Thr 75	
		a ggc ttc gcc cat o Gly Phe Ala His 90	
		c gcc ttc ttc gcg a Ala Phe Phe Ala 105	
		c agc gag atc aac e Ser Glu Ile Asn 0	
		g tgg ccg tgc gcc n Trp Pro Cys Ala 140	Ala Gly Gln Lys
		g atc tcg tgg aac n Ile Ser Trp Asn 155	
Pro Ala Gly Arg A		c gac ggg ctc gcc e Asp Gly Leu Ala 170	

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gtg gcg cag gac gcc gtg gtg gcg ttc aag gcg gcg ctc tgg ttc tgg
                                                                   576
Val Ala Gln Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe Trp
            180
atg aac aac gtg cac cgt gtg atg ccg cag ggc ttc ggc gcc acc atc
                                                                   624
Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr Ile
        195
agg gcc atc aac ggc gcg ctc gag tgc gac ggg aac aac ccc gcc cag
                                                                   672
Arg Ala Ile Asn Gly Ala Leu Glu Cys Asp Gly Asn Asn Pro Ala Gln
    210
                        215
atg aac gcg cgc gtc ggc tac tac aag cag tac tgc cgc cag ctc ggc
                                                                   720
Met Asn Ala Arg Val Gly Tyr Tyr Lys Gln Tyr Cys Arg Gln Leu Gly
                    230
gtc gac cca ggg ccc aac ctc act tgc tga
                                                                   750
Val Asp Pro Gly Pro Asn Leu Thr Cys *
                245
<210> 80
<211> 249
<212> PRT
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Ala Gly Cys Gln Ser
            20
Gly Pro Cys His Ser Gly Gly Gly Gly Ser Gly Gly Gly Ala Asn
                            40
Val Ala Ser Val Val Thr Asp Ser Phe Phe Asn Gly Ile Lys Ser Gln
                        55
Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala Phe
                    70
Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser Gln
                                    90
Val Gln Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Val Thr His
                                105
Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn Ala
                            120
Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln Lys
                        135
Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr Gly
                                        155
Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Ala Asp Pro Asn Arg
                                    170
Val Ala Gln Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe Trp
                                185
Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr Ile
                            200
Arg Ala Ile Asn Gly Ala Leu Glu Cys Asp Gly Asn Asn Pro Ala Gln
                        215
                                            220
Met Asn Ala Arg Val Gly Tyr Tyr Lys Gln Tyr Cys Arg Gln Leu Gly
                    230
                                        235
Val Asp Pro Gly Pro Asn Leu Thr Cys
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<210> 81
<211> 753
<212> DNA
<213> Artificial Sequence
<220>
<223> Variant sequence produced by shuffling techniques
<221> CDS
<222> (1) ... (753)
<400> 81
tcg atg cag aac tgc ggc tgc cag cca aac gta tgc tgc agc aag ttt
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
ggc tac tgc ggc acg acc gac gag tac tgc ggc gac ggg tgc cag tcg
                                                                   96
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
gge eeg tge eac teg gge gge gge age agt gge gge ggt ggt geg
                                                                   144
Gly Pro Cys His Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala
                             40
aat gtg gct aat gtg gtc acc gac gcg ttc ttc aac ggc atc aag aac
                                                                   192
Asn Val Ala Asn Val Val Thr Asp Ala Phe Phe Asn Gly Ile Lys Asn
                         55
cag gcc ggg agc ggg tgc gag ggc aag aac ttc tac acc cgg agc gcg
                                                                   240
Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala
                     70
ttc ctg age gcc gtc aag gcg tac cca ggc ttc gcc cat ggc ggg tcg
                                                                   288
Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser
                                     90
cag gtg cag ggc aag cgc gag att gcc gcc ttc ttc gcg cat gcc acg
                                                                   336
Gln Val Gln Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Ala Thr
            100
                                105
cac gag acc ggg cat ttc tgc tac atc agc gag atc aac aag agc aac
                                                                   384
His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn
                            120
gcc tac tgc gac ccg acc aag agg cag tgg ccg tgc gcc gcg ggg cag
                                                                   432
Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln
                        135
aag tac tac ggg cgc ggc ccg ctg cag atc tcg tgg aac tac aac tac
Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr
ggg ccc gcg ggg agg gcc atc ggc ttc gac ggg ctc ggg gac ccc ggc
                                                                   528
Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro Gly
                                     170
agg gtg gcg cgg gac gcc gtg gtg gcg ttc aag gcg gcg ctc tgg ttc
                                                                   576
Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe
                                185
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tgg atg aac aac gtg cac cgt gtg atg ccg cag ggg ttc ggt gcc acc

```
Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr
atc egg gee ate aac gge gee ete gag tge gge ggg aac aac eee gee
                                                                   672
Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Gly Gly Asn Asn Pro Ala
                        215
                                            220
cag atg aac gcg cgc atc ggc tac tac aag cag tac tgc cqc caq ctc
                                                                   720
Gln Met Asn Ala Arg Ile Gly Tyr Tyr Lys Gln Tyr Cys Arg Gln Leu
ggc gtc gac cca ggg ccc aac ctc act tgc tga
                                                                   753
Gly Val Asp Pro Gly Pro Asn Leu Thr Cys
                245
<210> 82
<211> 250
<212> PRT
<213> Artificial Sequence
<223> Variant sequence produced by shuffling techniques
<400> 82
Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe
Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser
                                25
Gly Pro Cys His Ser Gly Gly Gly Gly Ser Ser Gly Gly Gly Ala
                            40
Asn Val Ala Asn Val Val Thr Asp Ala Phe Phe Asn Gly Ile Lys Asn
                        55
Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn Phe Tyr Thr Arg Ser Ala
                    70
                                        75
Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly Phe Ala His Gly Gly Ser
                                    90
Gln Val Gln Gly Lys Arg Glu Ile Ala Ala Phe Phe Ala His Ala Thr
            100
                                105
                                                     110
His Glu Thr Gly His Phe Cys Tyr Ile Ser Glu Ile Asn Lys Ser Asn
                            120
Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp Pro Cys Ala Ala Gly Gln
                        135
                                            140
Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile Ser Trp Asn Tyr Asn Tyr
                    150
                                        155
Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp Gly Leu Gly Asp Pro Gly
                165
                                    170
Arg Val Ala Arg Asp Ala Val Val Ala Phe Lys Ala Ala Leu Trp Phe
            180
                                185
Trp Met Asn Asn Val His Arg Val Met Pro Gln Gly Phe Gly Ala Thr
                            200
Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys Gly Gly Asn Asn Pro Ala
                        215
Gln Met Asn Ala Arg Ile Gly Tyr Tyr Lys Gln Tyr Cys Arg Gln Leu
                    230
                                        235
Gly Val Asp Pro Gly Pro Asn Leu Thr Cys
                245
<210> 83
<211> 771
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<212> DNA

<213> Artificial Sequence

<220> <223> Variant sequence produced by shuffling techniques <221> CDS <222> (1) ... (771) <400> 83 tcg atg cag aac tgc ggc tgc cag cca aac gta tgc tgc agc aag ttc 48 Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe gge tac tgc ggc acg acc gac gag tac tgc ggc gac ggg tgc cag tcg 96 Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser 144 gga ggc agt ggt ggt qcq aac gtg gct agc gtc gtc acc ggc tcc ttc 192 Gly Gly Ser Gly Gly Ala Asn Val Ala Ser Val Val Thr Gly Ser Phe 50 ttc aac ggc atc aag agc cag gcc ggg agc ggg tgc gag ggc aag aac 240 Phe Asn Gly Ile Lys Ser Gln Ala Gly Ser Gly Cys Glu Gly Lys Asn ttc tac acc cgg agc gcg ttc ctg agc gcc gtc aag gcg tac cca ggc 288 Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly tte gee cat gge ggg teg cag gtg cag gge aag ege gag ate gee gee 336 Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala Ala 100 105 tte tte geg cat gte aeg cae gag ace ggg cat tte tge tae ate age 384 Phe Phe Ala His Val Thr His Glu Thr Gly His Phe Cys Tyr Ile Ser 120 gag atc aac aag agc aac gcc tac tgc gac ccg acc aag agg cag tgg 432 Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp 135 ccg tgc gcc gcg ggg cag aag tac tac ggg cgt ggc ccg ctg cag atc 480 Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile 150 teg tgg aac tac aac tac ggg eec geg ggg agg gee ate gge ttt gae 528 Ser Trp Asn Tyr Asn Tyr Gly Pro Ala Gly Arg Ala Ile Gly Phe Asp 165 ggg ctc gcc gac ccc aac agg gtg gcg cag gac gcc gtg gtg gcg ttc Gly Leu Ala Asp Pro Asn Arg Val Ala Gln Asp Ala Val Val Ala Phe aag gcg gcg ctc tgg ttc tgg atg aac aac gtg cac cgt gtg atg ccg 624 Lys Ala Ala Leu Trp Phe Trp Met Asn Asn Val His Arg Val Met Pro cag ggc ttc ggc gcc acc atc agg gcc atc aac ggc gcc ctc gag tgc 672 Gln Gly Phe Gly Ala Thr Ile Arg Ala Ile Asn Gly Ala Leu Glu Cys

ggc ggg aac aac ccc gcc cag atg aac gcg cgc gtc ggc tac tac agg 720 Gly Gly Asn Asn Pro Ala Gln Met Asn Ala Arg Val Gly Tyr Tyr Arg 235 240 768 Gln Tyr Cys Arg Gln Leu Gly Val Asp Pro Gly Pro Asn Leu Thr Cys 255 771 tga *

<210> 84 <211> 256 <212> PRT <213> Artificial Sequence

(213) Architetar Bequence

<220>

<223> Variant sequence produced by shuffling techniques

<400> 84 Ser Met Gln Asn Cys Gly Cys Gln Pro Asn Val Cys Cys Ser Lys Phe Gly Tyr Cys Gly Thr Thr Asp Glu Tyr Cys Gly Asp Gly Cys Gln Ser 25 40 Gly Gly Ser Gly Gly Ala Asn Val Ala Ser Val Val Thr Gly Ser Phe 55 Phe Asn Gly Ile Lys Ser Gln Ala Gly Ser Gly Cys Glu Gly Lys. Asn Phe Tyr Thr Arg Ser Ala Phe Leu Ser Ala Val Lys Ala Tyr Pro Gly 90 Phe Ala His Gly Gly Ser Gln Val Gln Gly Lys Arg Glu Ile Ala Ala 100 105 Phe Phe Ala His Val Thr His Glu Thr Gly His Phe Cys Tyr Ile Ser 120 Glu Ile Asn Lys Ser Asn Ala Tyr Cys Asp Pro Thr Lys Arg Gln Trp 135

 Ser
 Trp
 Asn
 Tyr
 Asn
 Tyr
 Gly
 Pro
 Ala
 Gly
 Arg
 Ala
 Ala
 Gln
 Asn
 Ala
 Ala
 Ala
 Ala
 Phe
 Arg
 Ala
 Ala
 Ala
 Arg
 Ala
 Arg
 Ala
 Arg
 Arg
 Ala
 Arg
 Arg</th

Pro Cys Ala Ala Gly Gln Lys Tyr Tyr Gly Arg Gly Pro Leu Gln Ile